LeCroy 9354A/M/L, 9354T/M

Digital Storage Oscilloscope

Service Manual

LeCroy

Innovators in Instrumentation

LeCroy 9354A/M/L, 9354T/M

Digital Storage Oscilloscope

Service Manual

Version 1.0

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LeCroy
Corporate Headquarters

700 Chestnut Ridge Road
Chestnut Ridge, NY 10977-6499

Tel : (914) 425-2000
Fax : (914) 425-8967

LeCroy
European Headquarters

2, rue du pré-de-la-Fontaine
1217 Meyrin 1 / Geneva, Switzerland

Tel : 41 (022) 719.21.11
Fax : 41 (022) 782.39.15

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SECTION 1 GENERAL INFORMATION

1.1 Initial Inspection

It is recommended that the shipment be thoroughly inspected immediately upon delivery to the purchaser. All material in the container should be checked against the enclosed Packing List. LeCroy cannot accept responsibility for shortages in comparison with the Packing List unless notified promptly. If the shipment is damaged in any way, please contact the Customer Service Department or local field office immediately.

1.2 Warranty

LeCroy warrants its oscilloscope products to operate within specifications under normal use for a period of three years from date of shipment. Spares, replacement parts and repairs are warranted for 90 days. The instrument's firmware is thoroughly tested and thought to be functional, but is supplied "as is" with no warranty of any kind covering detailed performance. Products not manufactured by LeCroy are covered solely by the warranty of the original equipment manufacturer.
In exercising this warranty, LeCroy will repair or, at its option, replace any product returned to the Customer Service Department or an authorized service facility within the warranty period, provided that the warrantor's examination discloses that the product is defective due to workmanship or materials and that the defect has not been caused by misuse, neglect, accident or abnormal conditions or operation.
LeCroy will return all in-warranty products with transportation prepaid.
This warranty is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. LeCroy shall not be liable for any special, incidental, or consequential damages, whether in contract or otherwise.

1.3 Product Assistance

Answers to questions concerning installation, calibration, and use of LeCroy equipment are available from the Customer Service Department, 700 Chestnut Ridge Road, Chestnut Ridge, New York 10977-6499, U.S.A., tel: (914) 578-6060, or 6061, and 2 rue du Pré-de-la-Fontaine, 1217 Meyrin 1, Geneva, Switzerland, tel : (41) 22.719.21.11, or your local field engineering office.

1.4 Addresses

Corporate Headquarters

LECROY CORPORATION
700 CHESTNUT RIDGE ROAD
CHESTNUT RIDGE, NY 10977-6499
USA

TEL: (914) 425-2000 578-6060 or 6061
FAX: (914) 425-8967

European Headquarters

LECROY SA
2, CHEMIN PRE-DE-LAFONTAINE
CH-1217 MEYRIN 1 GENEVA
SWITZERLAND

TEL: 41 (22) 719-21-11
FAX: 41 (22) 782-39-15

Europe

LECROY GMBH
MANNHEIMERSTRASSE 177
POSTFACH 103767
D-6900 HEIDELBERG GERMANY

TEL: 49.6221.831001
FAX: 49.6221.834655

LECROY BV
WAALRESEWEG 17
NL-5554 HA VALKENSWAARD
THE NETHERLANDS

TEL: 31.4902.8.9285
FAX: 31.4902.42628

LECROY LTD
28 BLACKLANDS WAY
ABINGDON, OXON OX14 1DY
GREAT BRITAIN

TEL: 44.23.553.31.14
FAX: 44.23.552.87.96

LECROY SARL
1, AVENUE DE L'ATLANTIQUE
LES ULIS 91976 COURTABOEUF
FRANCE

TEL: 33.1.69.18.83.20
FAX: 33.1.69.07.40.42

LECORY SRL
VIA CONCESIO 325
I-00188 ROMA
ITALY

TEL: 39.6.300.97.00
FAX: 39.6.300.96.00

LECROY SA
BAHNOFSTRASSE 18
5600 LENZBURG
SWITZERLAND

TEL: 4164.519.181
FAX: 4164.519.192

ESSA
EUIPOS Y SISTEMAS SA
APOLONIO MORALES 13-B
E-28036 MADRID

TEL: 34.1.359.0088
FAX: 34.1.359.0298

M.T. BRANDAO, LDA
RUA DO QUANZA, 150
4000 PORTO
PORTUGAL

TEL: 351.2.830.2709
FAX: 351.2.830.2710

DEWETRON ELEKTRONISCHE
MESSGERAETE Ges.M.B.H.
FOELLINGERSTRASSE 9E
8044 GRAZ AUSTRIA

TEL: 43.316.391.804
FAX: 43.316.391.052

LUTRONIC APS
NAVERLAND 2
2600 GLOSTRUP
DENMARK

TEL: 45.4342.9764
FAX: 45.4342.9765

ORBIS OY
VANHA KAARELANTIE 9
01610 VANTAA
FINLAND

TEL: 358.0.566.4066
FAX: 358.0.531.604

HELLENIC SCIENTIFIC REP., LTD
11 VRASSIDA STREET
115 28 ATHENS
GREECE

TEL: 30.1.721.1140 or 721.3154
FAX: 30.1.724.1374

AVANTEC
TVETENVEIEN 6
0661 OSLO NORWAY

TEL: 472.63.05.20
FAX: 472.65.84.14

ABB NERA A/S
KOKSTADVEGEN 23
KOKSTAD BERGEN NORWAY

TEL: 351.2.815.680
FAX: 351.2.815.630

MEASUREMENT SYSTEMS SCANDINAVIA AB
P.O. BOX 393 FORETAGSALLEN 12, HUS 5 BV
184 24 AKERSBERGA SWEDEN

TEL: 46.8.540.68100
FAX: 46.8.540.66536

Eastern Europe

ELSINCO GMBH
ROTENMUHLGASSE 11
1120 VIENNA
AUSTRIA

TEL: 43.222.812.1751
FAX: 43.222.812.2329

Mideast

AMMO
9, HARUGEI MALKHUT
RAMAT HACHAYAL. P.O BOX 13132,
61131 TEL AVIV ISRAEL

TEL: 972.3.6478740
FAX: 972.3.6478771

Asia

LECROY JAPAN CORPORATION
ESAKA SANSHO BLDG - 3RD FLOOR
16-3, 3-CHOME
TARUMICHO, SUITA CITY
OSAKA 564 JAPAN

TEL: 816.330.0961
FAX: 816.330.8096

LECROY JAPAN CORPORATION
ZAIKEN BLDG 6TH FLOOR
19-3, 2-CHOME
SASAZUKA, SHIBUYA-KU
TOKYO 151 JAPAN

TEL: 813.3376-9400
FAX: 813.3376.9587

SCIENTIFIC DEVICES AUSTRALIA
2 JACKS ROAD
SOUTH OAKLEIGH, VICTORIA
AUSTRALIA

TEL: 61.3579.3622
FAX: 61.3579.0971

TATA-HONEYWELL
55-A/8 & 9 HADAPSPAR
INDUSTRIAL ESTATE
PUNE 411 013 INDIA

TEL: 91.212.670445
FAX: 91.212.672205

E.C. GOUGH, LTD
245 ST.ASAPH STREET
P.O. BOX 22073
CHRISTCHURCH NEW ZEALAND

TEL: 64.3.3798.740
FAX: 64.3.3796.776

ELECTRO TECH CORPORATION
1ST FLOOR, 16 KAZI CHAMBERS
BAHADURSHAH ZAFAR ROAD
KARACHI-74800 PAKISTAN

TEL: 92.21.493-8087
FAX: 92.21.493-7749

SINGAPORE ELECTRONICS
AND ENGINEERING, LTD
24 ANG MO KIO STREET, 65
SINGAPORE 2056

TEL: 65.480.7783
FAX: 65.481.4272

ABEX ENGINEERING PTE. LTD.
37 KALLANG PUDDING ROAD 08-08
TONG LEE BUILDING BLOCK B
SINGAPORE 1334

TEL: 8412818
FAX: 8415988

LECOLN TECHNOLOGY CO.,LTD.
4F-1, NO. 214, SEC.1
HO PING E ROAD
TAIPEI TAIWAN R.O.C.

TEL: 886.2.365.0612
FAX: 886.2.367.1792

MEASURETRONIX
2102/31 RAMKAMHANG ROAD
BANGKOK 10240
THAILAND

TEL: 66.2.375.2733-4
FAX: 66.2.374.9965

SCHMIDT ELECTRONICS LTD
18 F, GREAT EAGLE CENTRE
23 HARBOUR ROAD WANCHAI
HONG KONG

TEL: 852.2507.0222
FAX: 852.2827.5656

WOOJOO HI-TECH CORP.
DONGHYUN BLDG.
102-4 MOONJUNG-DONG,
SONGPA-KU SEOUL 138-200 KOREA

TEL: 82.2.449.5472
FAX: 82.2.449.5475

P.T. DWI TUNGGAL JAYA SAKTI
WISMA RAJAWALI, 14TH FLOOR
JL JENDRAL SUDIRMAN
34 JAKARTA 10220INDONESIA

TEL: 62.21.570.4563
FAX: 62.21.583.218

North America

ALLAN CRAWFORD LTD
5835 COOPERS AV, MISSISSAUGA
ONTARIO L4Z 1Y2, CANADA

TEL: 416 890.2010
FAX: 416 890.1959

South America

SEARCH SA
VIAMONTE 1716 - PISO 7
1055 CAPITAL FEDERAL
ARGENTINA

TEL: 54.1.46.6156
FAX: 54.1.394.8374

ATP-HI-TEK
ALAMEDA AMAZONAS
422 ALPHAVILLE 06454-030
BARUEI, SP BRAZIL

TEL: 55.11.421.5477
FAX: 55.11.421.5032

Central America

NUCLEOELECTRONICA, SA
CALZ. LAS AGUILAS 101
DELEGATCION ALVARO OBREGON
01710 MEXICO, 20, d.f.
MEXICO

TEL: 52.5593.604
FAX: 52.5593.6021

South Africa

WESTPLEX LTD
TUSCANY HOUSE
376 OAK AVENUE
RANDBURG 2194
REPUBLIC OF SOUTH AFRICA

TEL: 27.11.787.0473
FAX: 27.11.787.0237

1.5 Maintenance Agreements

LeCroy offers a selection of customer support services. Maintenance agreements provide extended warranty and allow the customer to budget maintenance costs after the initial three years warranty has expired. Other services such as installation, training, enhancements and on-site repair are available through specific Supplemental Support Agreements.

1.6 Documentation Discrepancies

LeCroy is committed to providing state-of-the-art instrumentation and is continually refining and improving the performance of its products. While physical modifications can be implemented quite rapidly, the corrected documentation frequently requires more time to produce. Consequently, this manual may not agree in every detail with the accompanying product. There may be small discrepancies in the values of components for the purposes of pulse shape, timing, offset, etc., and, occasionally, minor logic changes. Where any such inconsistencies exist, please be assured that the unit is correct and incorporates the most up-to-date circuitry. In a similar way the firmware may undergo revision when the instrument is serviced. Should this be the case, manual updates will be made available as necessary.

1.7 Service Procedure

Products requiring maintenance should be returned to the Customer Service Department or authorized service facility. LeCroy will repair or replace any product under warranty at no charge. The purchaser is only responsible for one way transportation charges.
For all LeCroy products in need of repair after the warranty period, the customer must provide a Purchase Order Number before repairs can be initiated. The customer will be billed for parts and labor for the repair, as well as for shipping.

1.8 Return Procedure

To determine your nearest authorized service facility, contact the Customer Service Department or your field office. All products returned for repair should be identified by the model and serial numbers and include a description of the defect or failure, name and phone number of the user, and, in the case of products returned to the factory, a Return Authorization Number (RAN). The RAN may be obtained by contacting the customer service department in New York, tel: (914)578-6060, or 6061 ; in Geneva, tel: (41)22/719.21.11, or your nearest sales office.

Return shipment should be made prepaid. LeCroy will not accept C.O.D. or Collect Return Shipments. Air-freight is generally recommended. Wherever possible, the original shipping carton should be used. If a substitute carton is used, it should be rigid and be packed such that the product is surrounded with a minimum of four inches of excelsior or similar shock-absorbing material. In addressing the shipment, it is important that the Return Authorization Number be displayed on the outside of the container to ensure its prompt routing to the proper department within LeCroy.

1.9 Safety Precautions

The following servicing instructions are for use by qualified personnel only. Do not perform any servicing other than contained in service instructions. Refer to procedures prior to performing any service.

Exercise extreme safety when testing high energy power circuits. Always turn the power OFF, disconnect the power cord, discharge the cathode ray tube and all capacitors before disassembling the instrument.

The **W A R N I N G** symbol used in this manual indicates dangers that could result in personal injury.

The **C A U T I O N** symbol used in this manual identify conditions or practices that could damage the instrument.

1.10 Antistatic Precautions

C A U T I O N

Any static charge that builds on your person or clothing may be sufficient to destroy CMOS components, integrated circuits.
In order to avoid possible damage, the usual precautions against static electricity are required.

- Handle the boards in antistatic boxes or containers with foam specially designed to prevent static build-up.

- Ground yourself with a suitable wrist strap.

- Disassembly the instrument at a properly grounded work station equipped with antistatic mat.

- When handling the boards, do not touch the pins.

- Stock the boards in antistatic bags.

SECTION 2 SPECIFICATIONS

9354A/M/L & 9354T/M Digital Oscilloscope

LeCroy

The Digital Scope Specialists

9350A Family Digital Oscilloscopes
500 MHz Bandwidth, 2 GS/s

Main Features

- Two and Four Channel versions
- Up to 8M Point record length
- 2.5 ns Peak Detect
- Glitch, Pattern, Qualified, Interval, Dropout and TV Triggers
- 8-bit vertical resolution, 11 with ERES option
- Fully programmable via GPIB and RS-232-C
- Automatic PASS/FAIL testing
- Advanced Signal Processing
- DOS Compatible Floppy Disk and Memory Card options
- Internal Printer Option

High speed and long memory make this family the ideal general-purpose Digital Storage Oscilloscopes. Two and Four Channel simultaneous sampling at 500 MS/s meets demanding high-speed design applications. Even faster sampling may be achieved by combining channels, up to a maximum of 2 GS/s.

Acquisition memories may also be combined, providing up to 8 M Points of continuous or segmented waveform recording. Repetitive signals are digitized at up to 10 GS/s. These combined capabilities make the 9350A family the state-of-the-art in current DSO technology.

A unique peak detect scheme captures 2.5 ns glitches - even at slow time bases - *without destroying the underlying data*. This provides circuit designers with the benefits of peak detection without any loss of precision.

Live waveforms may be viewed simultaneously with up to 3 expansions, showing all of the signal detail. Expansions are shown as highlights on the main trace.

SMART Trigger modes like Glitch, Pattern, Dropout and TV allow you to capture precisely the events of interest. Pre- and Post-Trigger delay, and Time and Events Holdoff are also standard.

The 9350A family features the proven user-interface of LeCroy's portable scopes. A bright, high-resolution 9" CRT allows optimum waveform viewing under any conditions. Menus and text are arranged around the graticules - they never overwrite the waveforms. Dedicated control knobs keep the scope's performance at your fingertips.

A comprehensive range of signal processing functions including FFT and Math on live or stored waveforms, allows extensive waveform manipulation. DOS compatible floppy disk and memory card options store waveforms and test setups, and simplify data transfer to any PC.

Features and Benefits

PRECISION ACQUISITION

The 9350A family combines all the technologies required for accurate waveform digitizing. Low-noise high-sensitivity amplifiers drive 500 MS/s 8-bit ADC's which are clocked simultaneously by a high-precision timebase. 500 MHz system bandwidth allows accurate risetime measurements below 1 nanosecond. Vertical resolution can be enhanced to 11 bits using ERES.

MEMORY FOR ALL APPLICATIONS

The 9350A family offers three different memory lengths:
50k points per channel (std. versions),
250k points per channel ("M" versions),
2M points per channel ("L" versions).
Memory length may be extended by combining the acquisition memories of multiple channels (see table below).

Long memories provide higher horizontal resolution. LeCroy's unique memory management system, combined with an advanced peak detection system, maximizes the benefits of longer memory. Showing the entire waveform onscreen allows immediate location of glitches or other disturbances, and guarantees the highest possible sample rate on all timebases.

THE MOST ADVANCED PEAK DETECT

9350A family members offer 2.5 ns peak detect, available whenever the digitizer system runs at below 200MS/s This captures fast glitches or signal details that might have been missed due to undersampling.

One unwanted effect of other peak detection systems is a severe loss of horizontal (time) precision. This occurs because detected peaks are known to have occurred *during* a particular interval, but not at any specific time. This means that signals acquired with other manufacturers peak detection techniques cannot be successfully used for further processing or analysis.

LeCroy solves this problem by maintaining both peak detected *and* normally sampled waveforms for each signal. Thus the user gets all the benefits of peak detection without any loss of time precision.

EXTENSIVE TRIGGER SYSTEM

To capture rare or complex conditions, SMART trigger functions are available. These include Glitch with 2.5 ns resolution to trigger down to 1 ns and a unique Dropout mode, which triggers when the signal disappears for a selectable period of time. Other trigger modes include Pattern, Interval, State- or Edge-Qualified and TV.
TV trigger allows individual lines or fields in PAL, SECAM, NTSC and non-standard video to be selected. Pre- and Post-trigger delay are fully variable.

ProBus™ PROBE INTERFACE

The ProBus system provides a complete measurement solution from probe tip to oscilloscope display. ProBus is an intelligent interconnection between LeCroy oscilloscopes and a growing range of innovative probes, including high-bandwidth low-loading FET probes.

AUTOMATIC MEASUREMENTS

The following Parametric measurements are available, together with their Average, Highest, Lowest values and Standard Deviation:

amplitude	falltime	peak to peak
area	f 80-20%	period
base	f@level (abs)	risetime
cycles	f@level (%)	r 20-80%
delay	frequency	r@level (abs)
Δdelay	maximum	r@level (%)
Δt at level (abs)	mean	RMS
Δt at level (%)	median	std dev
Δt at level (t=0,abs)	minimum	top
Δt at level (t=0,%)	overshoot +	width
duty Cycle	overshoot -	

Pass/Fail testing allows up to 5 parameters to be tested against selectable thresholds. Waveform Limit Testing is performed using Masks which may be defined inside the instrument. Any failure will cause preprogrammed actions such as Hardcopy, Save, GPIB SRQ or Pulse Out.

DOS COMPATIBLE MASS STORAGE

All LeCroy 9300-series scopes offer an optional 3.5" 1.44 MB floppy disk drive which stores traces, setups, screen graphics and Pass/Fail templates. Data are stored as DOS files, which may be read directly by a PC. A high-speed DOS compatible PCMCIA memory card option is also available.

BUILT-IN PRINTER

As well as driving most printers and plotters via GPIB, RS-232-C and (optional) Centronics interface, the 9300 series offers an optional internal printer. This thermal printer produces full resolution screendumps, 126 x 90 mm, in under 10 seconds.

FLEXIBLE INTERFACING

GPIB and RS-232-C interfaces may be used for full remote control of the instrument. All front-panel and internal processing functions can be controlled via either interface. For applications where throughput is essential, the GPIB interface transfers hundreds of waveforms per second. A Front-Panel BNC connector may be setup to provide Pass/Fail test output pulses.

MULTIPLE DISPLAY MODES

The high-resolution raster display shows from one to four independent waveform grids. Waveforms are represented as dots joined by vectors which may be turned on or off. Four Zoom/Math traces may be used for zooming waveforms or for signal processing. The area to be zoomed is selected by moving an intensified portion of the main waveform. Persistence display mode allows easy viewing of signal changes over time, and XY mode plots any two sources against one another. Cursors are usable in all display modes.

EXTENSIVE WAVEFORM MATH

Standard built-in waveform processing includes mathematics (Add, Subtract, Multiply and Divide, Negation and Identity) and Summation Averaging (up to 1000 sweeps). Option WP01 provides Summed and Continuous Averaging, Waveform Math Functions, Extrema and Enhanced Resolution Modes. More information is available in the 9300 WP01 datasheet.

OPTIONAL FFT PACKAGE

Option WP02 provides comprehensive Spectral Analysis capabilities, permitting the system designer to identify characteristics which may not be apparent in the time domain. WP02 provides a wide selection of displayed projections and windowing functions, as well as averaging in the frequency domain. For more information, see the 9300 WP02 datasheet.

9350A Family Specifications

ACQUISITION SYSTEM
Bandwidth (-3 dB):
@ 50 Ω: DC to 500 MHz
100 mV/div: 400 MHz
50 mV/div and below: 350 MHz
@ 1 MΩ DC: DC to 250 MHz typ. at probe tip.
No. of Channels: 4 (9354A) or 2 (9350A)
No. of Digitizers: 4 (9354A) or 2 (9350A)
Maximum Sample Rate and Acquisition Memories: See table below.
Sensitivity: 2 mV/div to 5 V/div, fully variable.
Scale factors: A vast choice of probe attenuation factors are selectable.
Offset Range: 2.0 - 9.9 mV/div: ±120 mV
10.0 - 199 mV/div: ±1.2 V
0.2 - 5.0 V/div: ±24 V
DC Accuracy: ≤±2% full scale (8 divisions) at 0 V offset.
Vertical Resolution: 8 bits.
Bandwidth Limiter: 30 MHz
Input Coupling: AC, DC, GND.
Input Impedance: 1 MΩ//15 pF or 50 Ω ±1%.
Max Input:
1 MΩ: 250 V (DC+peak AC ≤10 kHz)
50 Ω: ±5 V DC (500 mW) or 5 V RMS

TIME BASE SYSTEM
Timebases: Main and up to 4 Zoom Traces.
Time/Div Range: 1 ns/div to 1,000 s/div.
Clock Accuracy: ≤10 ppm
Interpolator resolution: 10 ps
Roll Mode: ranges 500 ms to 1,000 s/div. For > 50k points:10 s to 1,000 s/div.
External Clock: ≤100 MHz on EXT input with ECL, TTL or zero crossing levels.Optional up to 500 MHz rear panel clock input.
External Reference: Optional 10 MHz rear-panel input.

TRIGGERING SYSTEM
Trigger Modes: Normal, Auto, Single, Stop.
Trigger Sources: CH1, CH2, Line, Ext, Ext/10 (9354A: CH3, CH4). Slope, Level and Coupling for each can be set independently.
Slope: Positive, Negative.
Coupling: AC, DC, HF (up to 500 MHz), LFREJ, HFREJ.
Pre-trigger recording: 0 to 100% of full scale (adjustable in 1% div increments).
Post-trigger delay: 0 to 10,000 divisions (adjustable in 0.1 div increments).
Holdoff by time: 10 ns to 20 s.
Holdoff by events: 0 to 99,999,999 events.
Internal Trigger Sensitivity Range: ±5 div.
EXT Trigger Max Input:
1 MΩ//15 pF: 250 V (DC+peak AC ≤10 kHz)
50 Ω ±1%: ±5 V DC (500 mW) or 5 V RMS
EXT Trigger Range: ±0.5 V (±5 V with Ext/10)
Trigger Timing: Trigger Date and Time are listed in the Memory Status Menu.
Trigger Comparator: Optional ECL rear panel output.

SMART TRIGGER TYPES
Pattern: Trigger on the logic AND of 5 inputs - CH1, CH2, CH3, CH4, and EXT Trigger, (9350A: 3 inputs - CH1, CH2, EXT) where each source can be defined as High, Low or Don't Care. The Trigger can be defined as the beginning or end of the specified pattern.
Signal or Pattern Width: Trigger on width between two limits selectable from 2.5ns to 20s.
Signal or Pattern Interval: Trigger on interval between two limits selectable from 10ns to 20s
Dropout: Trigger if the input signal drops out for longer than a time-out from 25ns to 20s.
State/Edge Qualified: Trigger on any source only if a given state (or transition) has occurred on another source. The delay between these events can be defined as a number of events on the trigger channel or as a time interval.
TV: Allows selection of both line (up to 1500) and field number (up to 8) for PAL, SECAM, NTSC or non-standard video.

ACQUISITION MODES
Random Interleaved Sampling (RIS): for repetitive signals from 1 ns/div to 2 µs/div (M,L: from 1 ns/div to 5 µs/div).
Single shot: for transient and repetitive signals from 10 ns/div (all channels active).
Peak detect: captures and displays 2.5 ns glitches or other high-speed events.
Sequence: Stores multiple events in segmented acquisition memories.
Number of segments available:
9350A-54A 2-200
9350AM-9354AM 2-500
9350AL-9354AL 2-2,000
Min. Dead Time between segments: 60 µs

DISPLAY
Waveform style: Vectors connect the individual sample points, which are highlighted as dots. Vectors may be switched off.
CRT: 12.5x17.5 cm (9" diagonal) raster.
Resolution: 810 x 696 points.
Modes: Normal, X-Y, Variable or Infinite Persistence.
Real-time Clock: Date, hours, minutes, seconds.
Graticules: Internally generated; separate intensity control for grids and waveforms.
Grids: 1, 2 or 4 grids.
Formats: YT, XY, and both together.

Channels Used	Maximum Sample Rate	Memory per Channel 9350A 9354A	 9350AM 9354AM	 9350AL 9354AL	Notes
All Peak Detect OFF	500 MS/s	50k	250k	2M	All channels active
All Peak Detect ON	100 MS/s data 400 MS/s peak	25k data + 25k peaks	100k data + 100k peaks	1M data + 1M peaks	All channels active 2.5 ns peak detect
Paired Peak Detect OFF	1 GS/s	100k	500k	4M	9350A: CH1 9354A: CH2 + CH3
Paired + PP 092 Peak Detect OFF	2 GS/s	200k	1M	8M	9354A models only

Vertical Zoom: Up to 5x Vertical Expansion (50x with averaging, up to 40 µV sensitivity).
Maximum Horizontal Zoom Factors:

9350A-9354A	1000x
9350AM-9354AM	5,000x
9350AL-9354AL	40,000x

Waveforms can be expanded to give 4-5 points/division. This implies zoom factors up to 200,000x for the 9354AL when channels are combined.

INTERNAL MEMORY
Waveform Memory: Up to four 16-bit Memories (M1, M2, M3, M4).
Processing Memory: Up to four 16-bit Waveform Processing Memories (A, B, C, D).
Setup Memory: Four non-volatile memories. Optional Cards or Disks may also be used for high-capacity waveform and setup storage.

CURSOR MEASUREMENTS
Relative Time: Two cursors provide time measurements with resolution of ±0.05% full-scale for unexpanded traces; up to 10% of the sampling interval for expanded traces. The corresponding frequency value is displayed.
Relative Voltage: Two horizontal bars measure voltage differences up to ±0.2% of full-scale in single-grid mode.
Absolute Time: A cross-hair marker measures time relative to the trigger and voltage with respect to ground.
Absolute Voltage: A reference bar measures voltage with respect to ground.

WAVEFORM PROCESSING
Up to four processing functions may be performed simultaneously. Functions available are: Add, Subtract, Multiply, Divide, Negate, Identity and Summation Averaging.
Average: Summed averaging of up to 1,000 waveforms in the basic instrument. Up to 10^6 averages are possible with Option WP01.
Envelope*: Max, Min, or Max and Min values of from 1 to 10^6 waveforms.
ERES*: Low-Pass digital filter provides up to 11 bits vertical resolution.
Sampled data is always available, even when a trace is turned off. Any of the above modes can be invoked without destroying the data.
FFT*: Spectral Analysis with four windowing functions and FFT averaging.
*Envelope and ERES modes are provided in Math Package WP01. FFT is in WP02.

AUTOSETUP
Pressing Autosetup sets timebase, trigger and sensitivity to display a wide range of repetitive signals. (Amplitude 2mV to 40V; frequency above 50Hz; Duty cycle greater than 0.1%).
Autosetup Time: Approximately 2 seconds.
Vertical Find: Automatically sets sensitivity and offset.

PROBES
Model: One PP002 (10:1, 10 MΩ // 15 pF) probe supplied per channel.
The 9350A family is fully compatible with LeCroy's range of FET Probes, which may be purchased separately.
Probe calibration: Max 1 V into 1 MΩ, 500 mV into 50 Ω, frequency and amplitude programmable, pulse or square wave selectable, rise and fall time 1 ns typical. Alternatively, the Calibrator output can provide a trigger output or a PASS/FAIL test output.

INTERFACING
Remote Control: Of all front-panel controls, as well as all internal functions is possible by GPIB and RS-232-C.
RS-232-C Port: Asynchronous up to 19200 baud for computer/terminal control or printer/plotter connection.
GPIB Port: (IEEE-488.1) Configurable as talker/listener for computer control and fast data transfer. Command Language complies with requirements of IEEE-488.2.
Centronics Port: Optional hardcopy parallel interface.
Hardcopy: Screen dumps are activated by a front-panel button or via remote control. TIFF and BMP formats are available for importing to Desktop Publishing programs. The following printers and plotters can be used to make hardcopies: HP DeskJet (color or BW), HP ThinkJet, QuietJet, LaserJet, PaintJet and EPSON printers. HP 7400 and 7500 series, or HPGL compatible plotters. An optional internal high resolution graphics printer is also available.

GENERAL
Auto-calibration ensures specified DC and timing accuracy.
Temperature: 5° to 40° C (41° to 104° F) rated 0° to 50° C (32° to 122° F) operating.
Humidity: <80%.
Shock & Vibration: Meets MIL-STD-810C modified to LeCroy design specifications and MIL-T-28800C.
Power: 90-250 V AC, 45-66 Hz, 230 W.
Battery Backup: Front-panel settings maintained for two years.
Dimensions: (HWD)8.5"x14.5"x16.25", 210mm x 370mm x 410mm.
Weight: 13 kg (28.6 lbs) net, 18.5 kg (40.7 lbs) shipping.
Warranty: Two years.

Ordering Information

Oscilloscope and Options

9354A/AM/AL	4-Ch Digital Oscilloscope
9350A/AM/AL	2-Ch Digital Oscilloscope
9XXX-WP01	Waveform Math
9XXX-WP02	FFT Processing
9XXX-MC01/04	Memory Card Reader w/512KB Memory Card
93XX-FD	Internal 3.5" Floppy Drive
93XX-GP	Internal Graphics Printer
935XA-CKTRIG	10MHz External Clock Reference Input 500MHz External Clock input Trigger Comparator Output

Oscilloscope Accessories Supplied with Instrument:

935X-OM	Operator's Manual
93XX-RCM	Remote Control Manual
93XX-FC	Front Cover
PP002	350MHz, 10MΩ Passive Probe (1 per channel)
PP092	ProBus Channel Multiplexer (9354A only)

Ordered separately:

93XX-W5	5 years extended warranty
93XX-CC	Calibration Certificate
935XA-SM	Service Manual
9XXX-MC02	128K Memory Card
9XXX-MC04	512K Memory Card
DC/GPIB	2 Meter GPIB Cable
SG9001	High Voltage Protector
OC9001	Oscilloscope Cart
AP020	1 GHz 10:1 FET Probe
AP021	800 MHz 5:1 FET Probe
AP030	15 MHz Differential Probe
PP062	1 GHz, 10:1, 500 Ω Passive Probe
PP090	ProBus 75 to 50 Ω adapter
93XX-RM01	Rackmount
93XX-TC1	Transit Case
93XX-TC2	Carrying Bag

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy GmbH	06221 83.10.01
ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	(01235) 533114

LeCroy

The Digital Scope Specialists

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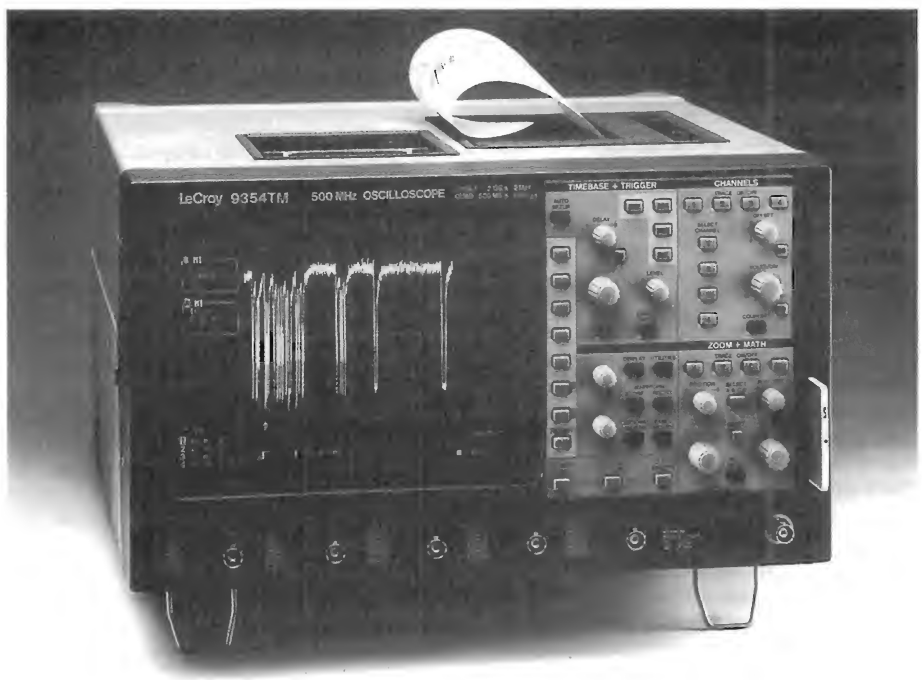
The Digital Scope Specialists

9354T/9354TM Digital Oscilloscopes
500 MHz Bandwidth, 2 GS/s

Main Features

- Four Channels
- Up to 2 M Point record length
- Advanced Peak Detect
- Glitch, Pattern, Qualified, Interval, Dropout and TV Triggers
- 8-bit vertical resolution, 11 with ERES option
- Fully programmable via GPIB and RS-232-C
- Automatic PASS/FAIL testing
- Advanced Signal Processing
- DOS Compatible Floppy Disk
- Internal Printer, PCMCIA Hard Disk and memory card available.



The 9354T and 9354TM are Total Performance products that provide high sampling speed, long memory, excellent analysis capability and superior I/O features. Four channel simultaneous sampling at 500 MS/s meets demanding high-speed design applications. Even faster sampling may be achieved by combining channels, up to a maximum of 2 GS/s. Acquisition memories may also be combined, providing up to 2 M Points of continuous or segmented waveform recording. Repetitive signals are digitized at up to 10 GS/s.

A unique peak detect scheme captures 2.5 ns glitches, even at slow time bases, *without destroying the underlying data.* This provides circuit designers with the benefits of peak detection without any loss of precision.

Live waveforms may be viewed simultaneously with up to 3 expansions on a total of 4 different display timebases, showing all of the signal detail. Expansions are shown as highlights on the main trace.

SMART Trigger modes like Glitch, Pattern, Dropout and TV allow the precise capture of events of interest. Pre- and Post-Trigger delay, and Time and Events Holdoff are also standard. The 9354T and 9354TM feature the proven user-interface of LeCroy's portable scopes. A bright, high-resolution 9" CRT allows optimum waveform viewing under any conditions. Menus and text are arranged around the graticules - they never overwrite the waveforms.

A comprehensive range of signal processing functions including FFT and Math on live or stored waveforms, allows extensive waveform manipulation. GPIB, RS-232-C and Centronics ports are standard as is a floppy disk drive. The 9354TM also includes an internal high resolution printer.

Features and Benefits

PRECISION ACQUISITION
The 9354T and 9354TM combine all the technologies required for accurate waveform digitizing. Low-noise high-sensitivity amplifiers drive 500 MS/s 8-bit ADC's which are clocked simultaneously by a high-precision timebase. 500 MHz system bandwidth allows accurate risetime measurements below 1 nanosecond. Vertical resolution can be enhanced to 11 bits using ERES.

MEMORY FOR ALL APPLICATIONS
The 9354T offers 100k points per channel, while the 9354TM has 500k points per channel. Memory length may be extended by combining the acquisition memories of multiple channels (see table below).

Long memories provide higher horizontal resolution. LeCroy's unique memory management system, combined with an advanced peak detection system, maximizes the benefits of longer memory. Showing the entire waveform onscreen allows immediate location of glitches or other disturbances, and guarantees the highest possible sample rate on all timebases.

THE MOST ADVANCED PEAK DETECT
The 9354T and 9354TM offer 2.5 ns peak detect, available whenever the digitizer system runs at below 200MS/s This captures fast glitches or signal details that might have been missed due to undersampling.

One unwanted effect of other peak detection systems is a severe loss of horizontal (time) precision. This occurs because detected peaks are known to have occurred *during* a particular interval, but not at any specific time. This means that signals acquired with other manufacturers peak detection techniques cannot be successfully used for further processing or analysis.

LeCroy solves this problem by maintaining both peak detected *and* normally sampled waveforms for each signal. Thus the user gets all the benefits of peak detection without any loss of time precision.

EXTENSIVE TRIGGER SYSTEM
To capture rare or complex conditions, SMART trigger functions are available. These include Glitch with 2.5 ns resolution to trigger down to 1 ns and a unique Dropout mode, which triggers when the signal disappears for a selectable period of time. Other trigger modes include Pattern, Interval, State- or Edge-Qualified and TV.
TV trigger allows individual lines or fields in PAL, SECAM, NTSC and non-standard video to be selected. Pre- and Post-trigger delay are fully variable.

ProBus™ PROBE INTERFACE
The ProBus system provides a complete measurement solution from probe tip to oscilloscope display. ProBus is an intelligent interconnection between LeCroy oscilloscopes and a growing range of innovative probes, including high-bandwidth low-loading FET probes.

AUTOMATIC MEASUREMENTS
The following Parametric measurements are available, together with their Average, Highest, Lowest values and Standard Deviation:

amplitude	falltime	peak to peak
area	f 80-20%	period
base	f@level (abs)	risetime
cycles	f@level (%)	r 20-80%
delay	frequency	r@level (abs)
Δdelay	maximum	r@level (%)
Δt at level (abs)	mean	RMS
Δt at level (%)	median	std dev
Δt at level (t=0,abs)	minimum	top
Δt at level (t=0,%)	overshoot +	width
duty Cycle	overshoot -	

Pass/Fail testing allows up to 5 parameters to be tested against selectable thresholds. Waveform Limit Testing is performed using Masks which may be defined inside the instrument. Any failure will cause preprogrammed actions such as Hardcopy, Save, GPIB SRQ or Pulse Out.

DOS COMPATIBLE MASS STORAGE
The 9354T and 9354TM scopes offer a 3.5" 1.44 MB floppy disk drive which stores traces, setups, screen graphics and Pass/Fail templates. Data are stored as DOS files, which may be read directly by a PC. High-speed DOS compatible PCMCIA memory card and hard disk options are also available.

BUILT-IN PRINTER
As well as driving most printers and plotters via GPIB, RS-232-C and Centronics interface, the 9354TM offers an internal high resolution graphics printer. This thermal printer produces full resolution screendumps, 126 x 90 mm, in under 10 seconds. The printer is optional for model 9354T.

FLEXIBLE INTERFACING
GPIB and RS-232-C interfaces may be used for full remote control of the instrument. All front-panel and internal processing functions can be controlled via either interface. For applications where throughput is essential, the GPIB interface transfers hundreds of waveforms per second. A Front-Panel BNC connector may be setup to provide Pass/Fail test output pulses.

MULTIPLE DISPLAY MODES
The high-resolution raster display shows from one to four independent waveform grids. Waveforms are represented as dots joined by vectors which may be turned on or off. Four Zoom/Math traces may be used for zooming waveforms or for signal processing. The area to be zoomed is selected by moving an intensified portion of the main waveform. Persistence display mode allows easy viewing of signal changes over time, and XY mode plots any two sources against one another. Cursors are usable in all display modes.

EXTENSIVE WAVEFORM MATH
Standard built-in waveform processing includes mathematics (Add, Subtract, Multiply and Divide, Negation and Identity) and Summation Averaging (up to 1000 sweeps). It also provides Summed and Continuous Averaging, Waveform Math Functions, Extrema and Enhanced Resolution Modes. More information is available in the 9300 WP01 datasheet.

FFT PACKAGE
The WP02 package provides comprehensive Spectral Analysis capabilities, permitting the system designer to identify characteristics which may not be apparent in the time domain. WP02 provides a wide selection of displayed projections and windowing functions, as well as averaging in the frequency domain. For more information, see the 9300 WP02 datasheet.

9354T and 9354TM Specifications

ACQUISITION SYSTEM
Bandwidth (-3 dB):
@ 50 Ω: DC to 500 MHz
100 mV/div: 400 MHz
50 mV/div and below: 350 MHz
@ 1 MΩ DC: DC to 250 MHz typ. at probe tip.
No. of Channels: 4
No. of Digitizers: 4
Maximum Sample Rate and Acquisition Memories: See table below.
Sensitivity: 2 mV/div to 5 V/div, fully variable.
Scale factors: A vast choice of probe attenuation factors are selectable.
Offset Range: 2.0 - 9.9 mV/div: ±120 mV
10.0 - 199 mV/div: ±1.2 V
0.2 - 5.0 V/div: ±24 V
DC Accuracy: ≤±2% full scale (8 divisions) at 0 V offset.
Vertical Resolution: 8 bits.
Bandwidth Limiter: 30 MHz
Input Coupling: AC, DC, GND.
Input Impedance: 1 MΩ//15 pF or 50 Ω ±1%.
Max Input:
1 MΩ: 250 V (DC+ peak AC ≤10 kHz)
50 Ω: ±5 V DC (500 mW) or 5 V RMS

TIME BASE SYSTEM
Timebases: Main and up to 4 Zoom Traces.
Time/Div Range: 1 ns/div to 1,000 s/div.
Clock Accuracy: ≤10 ppm
Interpolator resolution: 10 ps
Roll Mode: ranges 500 ms to 1,000 s/div. For > 50k points: 10 s to 1,000 s/div.
External Clock: ≤100 MHz on EXT input with ECL, TTL or zero crossing levels. Optional up to 500 MHz rear panel clock input.
External Reference: Optional 10 MHz rear-panel input.

TRIGGERING SYSTEM
Trigger Modes: Normal, Auto, Single, Stop.
Trigger Sources: CH1, CH2, CH3, CH4, Line, Ext, Ext/10. Slope, Level and Coupling for each can be set independently.
Slope: Positive, Negative.
Coupling: AC, DC, HF (up to 500 MHz), LFREJ, HFREJ.
Pre-trigger recording: 0 to 100% of full scale (adjustable in 1% div increments).
Post-trigger delay: 0 to 10,000 divisions (adjustable in 0.1 div increments).
Holdoff by time: 10 ns to 20 s.
Holdoff by events: 0 to 99,999,999 events.
Internal Trigger Sensitivity Range: ±5 div.
EXT Trigger Max Input:
1 MΩ//15 pF: 250 V (DC+ peak AC ≤10 kHz)
50 Ω ±1%: ±5 V DC (500 mW) or 5 V RMS
EXT Trigger Range: ±0.5 V (±5 V with Ext/10)
Trigger Timing: Trigger Date and Time are listed in the Memory Status Menu.
Trigger Comparator: Optional ECL rear panel output.

SMART TRIGGER TYPES
Pattern: Trigger on the logic AND of 5 inputs - CH1, CH2, CH3, CH4, and EXT Trigger, where each source can be defined as High, Low or Don't Care. The Trigger can be defined as the beginning or end of the specified pattern.
Signal or Pattern Width: Trigger on width between two limits selectable from 2.5ns to 20s.
Signal or Pattern Interval: Trigger on interval between two limits selectable from 10ns to 20s
Dropout: Trigger if the input signal drops out for longer than a time-out from 25ns to 20s.
State/Edge Qualified: Trigger on any source only if a given state (or transition) has occurred on another source. The delay between these events can be defined as a number of events on the trigger channel or as a time interval.
TV: Allows selection of both line (up to 1500) and field number (up to 8) for PAL, SECAM, NTSC or nonstandard video.

ACQUISITION MODES
Random Interleaved Sampling (RIS): for repetitive signals from 1 ns/div to 5 µs/div.
Single shot: for transient and repetitive signals from 10 ns/div (all channels active).
Peak detect: captures and displays 2.5 ns glitches or other high-speed events.
Sequence: Stores multiple events in segmented acquisition memories.
Number of segments available:
9354T 2-500
9354TM 2-2000
Min. Dead Time between segments: 60 µs

DISPLAY
Waveform style: Vectors connect the individual sample points, which are highlighted as dots. Vectors may be switched off.
CRT: 12.5x17.5 cm (9" diagonal) raster.
Resolution: 810 x 696 points.
Modes: Normal, X-Y, Variable or Infinite Persistence.
Real-time Clock: Date, hours, minutes, seconds.
Graticules: Internally generated; separate intensity control for grids and waveforms.
Grids: 1, 2 or 4 grids.
Formats: YT, XY, and both together.
Vertical Zoom: Up to 5x Vertical Expansion (50x with averaging, up to 40 µV sensitivity).
Maximum Horizontal Zoom Factors:
9354T 4000x
9354TM 20000x
Waveforms can be expanded to give 2 points/division. This implies zoom factors up to 100,000x for the 9354TM when channels are combined.

INTERNAL MEMORY
Waveform Memory: Up to four 16-bit Memories (M1, M2, M3, M4).
Processing Memory: Up to four 16-bit Waveform Processing Memories (A, B, C, D).
Setup Memory: Four nonvolatile memories. Optional Cards or Disks may also be used for high-capacity waveform and setup storage.

Channels Used	Maximum Sample Rate	Memory per Channel 9354T	9354TM	Notes
All Peak Detect OFF	500 MS/s	100k	500k	All channels active
All Peak Detect ON	100 MS/s data 400 MS/s peak	50k data + 50k peaks	250k data + 250k peaks	All channels active 2.5 ns peak detect
Paired Peak Detect OFF	1 GS/s	250k	1M	CH2 + CH3
Paired + PP 092 Peak Detect OFF	2 GS/s	500k	2M	

CURSOR MEASUREMENTS

Relative Time: Two cursors provide time measurements with resolution of ±0.05% full-scale for unexpanded traces; up to 10% of the sampling interval for expanded traces. The corresponding frequency value is displayed.
Relative Voltage: Two horizontal bars measure voltage differences up to ±0.2% of full-scale in single-grid mode.
Absolute Time: A cross-hair marker measures time relative to the trigger and voltage with respect to ground.
Absolute Voltage: A reference bar measures voltage with respect to ground.

WAVEFORM PROCESSING

Up to four processing functions may be performed simultaneously. Functions available are: Add, Subtract, Multiply, Divide, Negate, Identity and Summation Averaging.
Average: Summed averaging of up to 1,000 waveforms in the basic instrument. Up to 10^6 averages are possible with Option WP01.
Envelope*: Max, Min, or Max and Min values of from 1 to 10^6 waveforms.
ERES*: Low-Pass digital filter provides up to 11 bits vertical resolution.
Sampled data is always available, even when a trace is turned off. Any of the above modes can be invoked without destroying the data.
FFT*: Spectral Analysis with four windowing functions and FFT averaging.
*Envelope and ERES modes are provided in Math Package WP01. FFT is in WP02.

AUTOSETUP

Pressing Autosetup sets timebase, trigger and sensitivity to display a wide range of repetitive signals. (Amplitude 2mV to 40V; frequency above 50Hz; Duty cycle greater than 0.1%).
Autosetup Time: Approximately 2 seconds.
Vertical Find: Automatically sets sensitivity and offset.

PROBES

Model: One PP002 (10:1, 10 MΩ // 15 pF) probe supplied per channel.
The 9354T and 9354TM are fully compatible with LeCroy's range of FET Probes, which may be purchased separately.
Probe calibration: Max 1 V into 1 MΩ, 500 mV into 50 Ω, frequency and amplitude programmable, pulse or square wave selectable, rise and fall time 1 ns typical. Alternatively, the Calibrator output can provide a trigger output or a PASS/FAIL test output.

INTERFACING

Remote Control: Of all front-panel controls, as well as all internal functions is possible by GPIB and RS-232-C.
RS-232-C Port: Asynchronous up to 19200 baud for computer/terminal control or printer/plotter connection.
GPIB Port: (IEEE-488.1) Configurable as talker/listener for computer control and fast data transfer. Command Language complies with requirements of IEEE-488.2.
Centronics Port: Optional hardcopy parallel interface (included with 9354TM).
Hardcopy: Screen dumps are activated by a front-panel button or via remote control. TIFF and BMP formats are available for importing to Desktop Publishing programs. The following printers and plotters can be used to make hardcopies: HP DeskJet (color or BW), HP ThinkJet, QuietJet, LaserJet, PaintJet and EPSON printers. HP 7400 and 7500 series, or HPGL compatible plotters. An optional internal high resolution graphics printer is also available (included with 9354TM).

GENERAL

Auto-calibration ensures specified DC and timing accuracy.
Temperature: 5° to 40° C (41° to 104° F) rated 0° to 50° C (32° to 122° F) operating.
Humidity: <80%.
Shock & Vibration: Meets MIL-STD-810C modified to LeCroy design specifications and MIL-T-28800C.
Power: 90-250 V AC, 45-66 Hz, 230 W.
Battery Backup: Front-panel settings maintained for two years.
Dimensions: (HWD) 8.5"x14.5"x16.25", 210mm x 370mm x 410mm.
Weight: 13 kg (28.6 lbs) net, 18.5 kg (40.7 lbs) shipping.
Warranty: Two years.

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy GmbH	06221 83.10.01
ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	(01235) 533114

Ordering Information

Oscilloscope and Options

9354T/TM	4-Ch Digital Oscilloscope
9XXX-MC01/04	Memory Card Reader w/512KB Memory Card
93XX-HD01	Hard Disk Adapter
93XX-HD02	PCMCIA Hard Disk
93XX-DA01-110	PCMCIA type III external desktop adaptor for PC (110v)
93XX-DA01-220	PCMCIA type III external desktop adaptor for PC (220v)
93XX-HDD	HD01/HD02 combination
93XX-DDM	Disk Drive Measurements
93XX-PRML	Supplementary Disk Drive Measurements
935XA-CKTRIG	10MHz External Clock Reference Input 500MHz External Clock input Trigger Comparator Output
93XX-W5	5 Year Warranty
93XX-C5	5 Year Calibration Contract
93XX-T5	5 Year Warranty and Calibration

Oscilloscope Accessories
Supplied with Instrument:

935X-OM	Operator's Manual
93XX-RCM	Remote Control Manual
93XX-FC	Front Cover
PP002	350MHz, 10M Ω Passive Probe (1 per channel)
PP092	ProBus Channel Multiplexer
9XXX-WP01	Waveform Math
9XXX-WP02	FFT Processing
93XX-FD01	Floppy Drive
93XX-GP01	Internal Graphics Printer (Included with 9354TM only)

Ordered separately:

93XX-CC	Calibration Certificate
935XT-SM	Service Manual
9XXX-MC02	128K Memory Card
9XXX-MC04	512K Memory Card
DC/GPIB	2 Meter GPIB Cable
SG9001	High Voltage Protector
OC9002	Oscilloscope Cart
AP020	1 GHz 10:1 FET Probe
AP021	800 MHz 5:1 FET Probe
AP030	15 MHz Differential Probe
PP062	1 GHz, 10:1, 500 Ω Passive Probe
PP090	ProBus 75 to 50 Ω adapter
93XX-RM01	Rackmount
93XX-TC1	Transit Case
93XX-TC2	Carrying Bag

Various option bundling schemes available. Contact your nearest LeCroy subsidiary or representative for more information.

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The Digital Scope Specialists

9300 Series PCMCIA Hard Disk Adapter, Internal Printer, 3.5" Floppy Disk Drive and Ram Card

Main Features

- PCMCIA Type III compatible Hard DIsk Adapter, DOS Compatible
- High-resolution Printer, ideal for fast, on-the-spot documentation
- 3.5" Floppy disk drive, DOS format - affordable and convenient
- Ultra-fast RAM card, DOS format, ideal for PASS/FAIL testing
- Convenient Hardcopy storage to card/disk

3.5" Floppy

The floppy drive is a convenient storage medium, not only for saving and retrieving waveforms or instrument settings, but also for storing hardcopies that can be printed from a PC when desired. The floppy supports both 720k and 1.44M DOS formats so that it can be read back on any PC with a 3.5" drive, avoiding the need to interface the oscilloscope to your PC. As with the RAM-card option, the floppy system capabilities include automatic storage of data under pre-programmed conditions.

PCMCIA Storage

PCMCIA Interfaces for RAM card and Hard Disk allow the use of fast, removable and compact storage media for saving and retrieving waveforms and instrument settings. They comply fully with the PC industry's PCMCIA and JEIDA standards. With the special Autostore feature, waveforms can be automatically stored after every acquisition and "played back" when desired. When used in combination with the PASS/FAIL feature, failure data can be saved automatically for later analysis.

Printer

The internal printer is an invaluable tool for instant, on-the-spot documentation. It generates a clear, crisp hardcopy of the screen in just a few seconds. The large size of the printout, combined with its high resolution, provide you with an excellent document that matches the screen's superior quality to its finest details. And because it frees you from the trouble of carrying and interfacing a bulky printer, it is the ideal solution for field measurements.

Mass Storage Features and Benefits

LeCroy's mass storage capabilities provide a range of benefits:
- Easy data transfers to PCs
- Waveform logging
- Waveform archiving for future use
- Faster troubleshooting
- Faster, more reproducible testing
- Shared oscilloscope resources

EASY DATA TRANSFER TO PC

Because the 9300 series oscilloscope uses DOS-formatted floppy disks, hard disks and memory cards, transferring waveform data to a PC is simple. The removable storage allows transfers without cables, programming, or any knowledge of GPIB, RS-232, or other interfaces.

In addition, LeCroy provides free of charge, a binary-to-ASCII format conversion program for the PC, accommodating those PC-based analysis packages (such as spreadsheets) that require ASCII format.

WAVEFORM LOGGING

By using Glitch or Dropout triggering in combination with the powerful AUTO-STORE mode, LeCroy oscilloscopes can monitor and log intermittent problems automatically. To store a waveform, the oscilloscope opens and names a DOS-compatible file and then stores the waveform data in the file. This logging feature requires no operator intervention and maintains data and the operational setup through power line failures. Logged waveforms can be selectively played back by trigger time/date or by sequence number, or can be scrolled through sequentially.

WAVEFORM ARCHIVING FOR FUTURE USE

- Recallable proof of performance
- Additional data analysis as needed
- Accurate trend or drift monitoring
- Calibration procedure verification

When storing waveforms, LeCroy DSOs also archive a header of setup information and the acquisition time/date. After recalling an archived waveform, the several hundred byte header ensures correct time and voltage scaling. When recalled into the oscilloscope, the waveform can be zoom expanded, compared, or analyzed just like a live waveform. The time/date offers proof of measurement authenticity and trend sequence.

All LeCroy DSOs store raw waveform data using one byte per sample point. Signal averaged, Enhanced Resolution (ERES) filtered, and other processed data use two bytes per point, to take advantage of the added resolution.

HARDCOPY ARCHIVING

Hardcopies of the screen can also be stored for future use. For instance, a screen saved in TIFF format can be imported into a Word Processor to illustrate a report. Additionally, field-measurement screens can be saved in LaserJet format on the memory card or floppy disk, and then printed from a PC back in the lab.

FASTER FIELD MEASUREMENTS

Recallable reference waveforms and oscilloscope setups for each test point on a Device Under Test (DUT) can make fault troubleshooting faster and more accurate. A dedicated memory card or floppy disk will hold all of the correct test point waveforms and associated DSO setups for a particular DUT.

The technician can recall stored setups quickly and consistently, thereby avoiding incorrect measurement conditions. He can then compare actual waveforms to recalled reference waveforms taken from a known working system. He will therefore spend less time probing a large number of test points and verifying that the correct waveforms exist.

If a problem is found, the aberrant waveform may be saved. It can later be shown to laboratory-based engineers, for example, for problem-solving guidance or for improvement of DUT design.

Memory cards - rugged and pocket-sized - are ideal for this application.

FASTER, MORE REPRODUCIBLE TESTING

LeCroy oscilloscopes will compare measured waveforms against upper and lower waveshape tolerances or against parameter limits, such as risetime, overshoot, or peak voltage, and make PASS/FAIL decisions. This PASS/FAIL testing decreases test times in GPIB-based ATE systems by reducing data transfers. It increases reproducibility and accuracy in manual tests by eliminating human errors.

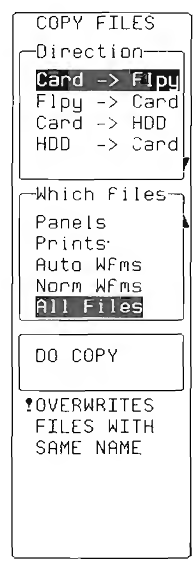
Once defined, these tests may be saved by storing instrument setups which include the specified tolerances and/or reference waveforms. Different test personnel can easily share a common test library via a PC network.

Waveshape test limits can be generated by capturing a "golden" waveform and by then selecting amplitude and timing limits (in fractions of screen graticule divisions). Or a user can create standard waveform limit templates on a computer (e.g. ANSI/CCITT telecommunication templates).

With the LeCroy 9300 series DSOs, specific parameter tolerance test procedures are created by selecting limits for any five out of twenty pulse parameters with Boolean AND / OR conditions between them. During testing, FAIL responses can include an audible beep, GPIB SRQ, hardcopy output, or store to memory card.

SHARED OSCILLOSCOPE RESOURCES

By plugging-in your *personal* floppy disk, RAM card or PCMCIA Hard Disk you can restore your setup in seconds. Individual users can keep preferred setups on separate disks or cards or within separate directories.



A selection of files can be copied between the available mass storage devices.

Hardcopy Features and Benefits

The internal printer adds a whole range of benefits to the LeCroy 9300 series:
- Ultra-fast printouts
- High resolution printing
- Easy transportation
- Trouble-free interfacing
- Auto Print on Trigger

ULTRA-FAST PRINTOUTS
Measurement documentation is made easier and faster since the internal printer produces a hardcopy in less than 10 seconds. In addition the document is date- and time-stamped: a real bonus for archiving test results.

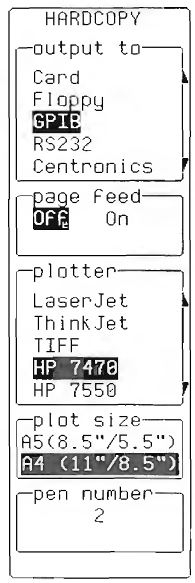
HIGH RESOLUTION PRINTING
With a resolution of 190 dots-per-inch, the internal printer matches the screen's superior quality. And for even higher resolution, the printout can be stretched to a full 70 meter length so you can see those traces down to their finest details.

EASY TRANSPORTATION
A printer that is totally integrated in the instrument makes life much easier for field-measurement applications. Imagine carrying a scope, a printer (and perhaps a floppy drive) in one hand!

TROUBLE-FREE INTERFACING
The internal printer frees your mind from the struggle with cable schematics, baud rates, gender-changers and dip switches, for more productive tasks. Select the internal printer in the scope's utilities menu, hit the SCREEN DUMP button, and you're in business!

AUTO PRINT ON TRIGGER
The Auto Print feature is used to print a screen image on each acquisition.

The 9300 series oscilloscope supports a whole range of popular printers and plotters. Hardcopies can be either sent directly to the peripheral device or to the floppy disk, Ram Card or Hard disk for future use.



OTHER HARDCOPY SOLUTIONS
High quality project reports, presentation materials, technical manuals, and troubleshooting instructions often require integration of text and graphics on the same page.
Advanced PC desktop publishing and word processors such as Word-for-Windows, WordPerfect, or AMI Pro can directly import graphic files, size them, and position them anywhere on the page. Written text can then wrap around or be positioned within the graphics.

LeCroy 9300 oscilloscopes will save screens in TIFF (Tagged Image Format File), or BMP. After transferring the file to a PC, the DTP software can import and manipulate the document like any other graphic object.

The LeCroy 9300 series also offers a wide range of interfacing capabilities with external hardcopy devices:

- Plotters. HPGL, HP 7400 and 7500 compatible
- Printers. HP LaserJet, ThinkJet, Paintjet (including color), DeskJet (including color) and Epson
- Interfacing. RS-232, GPIB, or even Centronics (optional)

Specifications

MASS STORAGE

	Floppy Disk	Ram Card	Hard Disk
Compatibility	3.5" Floppy Drive	PCMCIA I, II JEIDA 3.0, 4.0	PCMCIA III
Supported Formats	DOS Format	Read/Write: SRAM Read: OTP, ROM, Flash DOS Format	DOS Format
Size	720k byte, 1.44M byte	Up to 8M byte	Up to 512M byte * Note 1
Max Transfer Rate	18k byte/sec	500k byte/sec	150k byte/sec
Typical waveform Transfer Speed (Store/Recall) **1000 point** **10000 point** **100000 point** **1M point**	 1.1s / 0.4s 1.8s / 1.0s 7.5s / 6.5s 57s / 55s	 40ms / 30ms 70ms / 60ms 300ms / 300ms 2s / 2s	 140ms / 120ms 240ms / 220ms 1.0s / 0.9s 7.0s / 6.5s

Waveform File size: A channel-trace will use 1 byte per sample plus approximately 360 bytes of waveform descriptor. A processed trace will use 2 bytes per sample.
Template Size: Approximately 21k bytes.
Panel Setup Size: Approximately 3k bytes.

*Note 1: When available

PRINTER
Type: Raster printer, thermal.
Resolution: 190 DPI.
Printout Size: 126 mm x 90 mm
Paper: Thermal printer paper, 30 meter roll, 110 mm width, type Seiko or similar.
Printing speed: 6 seconds approx. for one screen.

LeCroy
The Digital Scope Specialists

AP003, AP020 and AP021 Active FET Probes

Main Features

- Bandwidths to 1 GHz
- LeCroy ProBus™ interface for the AP020 and the AP021
- 1 MΩ input Impedance
- Low capacitance at probe tip
- Rugged mechanical construction
- Automatic sensing and control on scopes equipped with ProBus™

FET Probes provide the oscilloscope user with a higher level of measurement capability. Compared with passive probes, they offer low circuit loading, low capacitance and high bandwidth. This combination makes them the ideal tools for working on sensititve or high-speed electronics.

This performance is achieved by the integration of a high-impedance Field Effect Transistor (FET) amplifier into the probe tip. The circuit under test sees only the amplifier's input impedance - it is effectively buffered from the scope's input impedance and the probe cable.

LeCroy's AP series of FET probes are mechanically rugged in design, while their miniature construction allows them to be used in hand-held PCB probing applications. Their detachable tips are designed for simple replacement, and they are supplied with a full set of accessories.

Models AP020 and AP021 offer 1 GHz and 800 MHz Bandwidth respectively. AP020 features X10 signal attenuation and is especially recommended for LeCroy's 9320 and 9324 1 GHz oscilloscopes. The AP021 offers X5 attenuation when used with the new 9360.

As an active device, the FET probe requires a stabilized power supply. LeCroy provides an elegant solution to this with the ProBus™ probe interface.

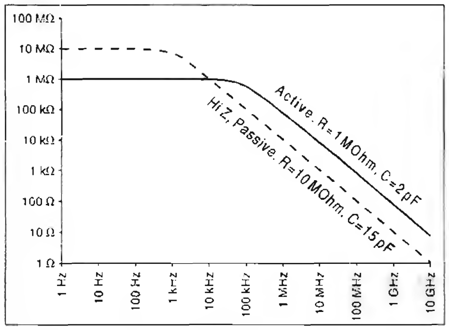
ProBus™ provides probe power and signal connection in one integrated package. It also allows the scope to control other probe functions, such as input coupling and DC offset. The ProBus™ interface is now available on a growing range of LeCroy oscilloscopes and probes. AP003 has an external power connector for use with scopes which are not ProBus™ compatible. All other models use the ProBus™ interface.

Features and Benefits

Connecting a probe to a circuit can significantly distort its signals by adding undesired loading - mostly capacitive and resistive. FET probes offer high resistance and low capacitance therefore they present minimal loading to the circuit under test, and protect from making erroneous measurements.

HIGH RESISTANCE
Low resistance probes have significant DC effects when used in high impedance circuits. They can greatly affect the behaviour of the device under test by changing the swing and the DC offset of the probed signal. A 1 MΩ impedance FET probe will not affect gain or offset in virtually all the cases.

LOW CAPACITANCE
Although not important in DC measurements, capacitive loading is very disruptive at high signal frequencies. The capacitive loading effects can be drastic. When probed with a 10 MΩ, 15 pF passive probe, a 100 MHz signal "sees" a 100 Ω load as illustrated on the picture below.



Probe Impedance versus Frequency

With only 2 pF of capacitance at the probe tip, LeCroy's FET probes reduce circuit loading at high frequencies by a factor of 10. Minimizing tip capacitance can also push the probe's resonant frequency beyond the system bandwidth. Sensitivity to ground lead inductance is also minimized.

PROBUS
The ProBus™ system is a complete measurement solution from probe tip to oscilloscope display. It supplies power to active probes, while automatically sensing probe attenuation. ProBus™ enables direct control of the probe offset and input coupling from the scope's front panel, extending the instrument's accuracy up to the probe tip. In addition, ProBus™ automatically optimizes scope and probe offset adjustments, calibrates the gain at the probe tip and compensates for non-linearities, providing most accurate measurements.

Specifications

MODEL	AP003	AP020	AP021
Bandwidth (MHz)	DC-1000	DC-1000	DC-800
Risetime (psec)	< 350	< 350	< 437
Attenuation	10:1 ±2%	10:1±2%	5:1±2%
Input R (MΩ)	1 ±5%	1±2%	1±2%
Input C (pF)	1.9 ±0.3	1.8 ±0.2	2.7 ±0.2
Max Input Voltage	±100 V	±40 V	±20 V

MODEL	AP003	AP020	AP021
Dynamic Range	±7 V	±5 V	±2.5 V
DC Offset Range	N/A	±20 V	±10 V
Input Coupling	DC	DC/AC	DC/AC
Total length (m)	1.5	1.5	1.5
Power requirement	±12 V	±12 V	±12 V
Interface	N/A	ProBus™	ProBus™

Recommended Matching

LeCroy Model	AP-003	AP-020	AP-021
9304-10-14	XX		
9360-61			X
9320-24		X	
94XX	X		
7200	XX		
7200A	X		
ScopeStation	X		

X: External Power Supply not required
XX: External Power Supply required

Ordering Information

AP003	1 GHz active FET probe
AP020	1 GHz active FET probe
AP021	800 MHz active FET probe with ProBus™ interface. All probes are shipped with the following accessories: 1x Retractable hook 1x Ground Lead 1x BNC Adaptor 1x IC Tip 3x Ground Bayonets 1x Mini pincher with Lead Adaptor
AP501	Power Supply for the AP003

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
CANADA	LeCroy Cnd	514.928.4707
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy GmbH	06221 83.10.01
ITALY Milano	LeCroy SRL	02.204.70.82
ITALY Rome	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	0235-533114

Other sales and service representatives throughout the world.

LeCroy
The Digital Scope Specialists

AP030, SI 9000 and SI 9000A Active Differential Probes

Main Features

- Bandwidths to 15 MHz
- Multiple:
  - Attenuations
  - Differential Voltage Ranges
  - Common Mode Voltages
- High Input Impedance
- Rugged and Lightweight Mechanical Construction

The Models AP030, SI 9000 and SI 9000A are fully differential active probes designed for applications where electric signals must be measured relative to a floating voltage, other than ground potential.

These probes are designed specifically for situations where:

- the reference voltage may be several hundreds volts above or below ground;
- measurements require the rejection of common-mode signals, (e.g. to evaluate small amplitude pulses riding on big common-mode signals);
- ground loops and currents produce so much interference that small signals cannot be detected.

With these differential probes the oscilloscope user avoids both the dangerous practice of floating the scope, and the technique of using two scope channels in "Invert and Add" mode, which is limited both in common mode rejection and in dynamic range.

Models AP030, SI 9000 and SI 9000A are lightweight and easy to use. They have the rugged mechanical construction required for laboratory, manufacturing and field service environments, and are battery powered for greater safety and convenience.

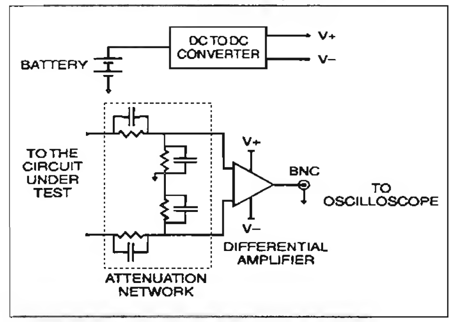
Features and Benefits

FULLY DIFFERENTIAL INPUTS
The probes are fully differential active devices. The differential technique allows measurements to be made between two points in a circuit without reference to ground. The two input signals are processed inside the probe (as illustrated in figure) and the resulting single-ended signal may be measured by any grounded oscilloscope.

HIGH COMMON MODE VOLTAGE
The three probes offer a range of Common Mode Voltages from 40 V to 1000 V.

RUGGED CONSTRUCTION
The probes are designed to be compact and lightweight with power provided by four AA size 1.5 V batteries. A rubber casing enhances the probes' resistance to shocks.

SAFETY
Use of differential probes is safe within the specified voltages. Their use avoids less reliable alternatives, or possible dangerous practices.



Specifications

MODEL	**AP030**	**SI 9000**	**SI 9000A**
Bandwidth (MHz)	15 MHz	15 MHz	15 MHz
Risetime	24 ns	24 ns	24 ns
Attenuation	1:10/1:100	1:20/1:200	1:50/1:500
Atten. Accuracy	2%	2%	2%
Input Resistance	2 MΩ	2 MΩ	2 MΩ
Input Capacitance		12 pF each side to ground	
Input Configuration		Differential	
Input Voltage			
Differential Max	±400 VDC or 280 Vrms for 1:100	±700 VDC or 500 Vms for 1:200	±1000 VDC or 700 Vrms for 1:500
	±40 VDC or 28 Vrms for 1:10	±70 VDC or 50 Vms for 1:20	100 VDC or 70 Vrms for 1:50
Common Mode Max	±420 VDC or 300 Vrms	±700 VDC or 500 Vrms	±1000 VDC or 700 Vrms
Absolute Max		±1000 VDC or 700 Vrms	
CMRR			
50Hz	-90db	-80db	-80db
1KHz	-80db	-70db	-70db
1MHz	-53 db	-45db	-45db
Output Voltage			
Amplitude Max	±4 V	±3.5 V	±2 V
Offset	<± 5 mV	<±10 mV	<±10 mV
		typical -10° C to +40° C	
Noise		1.5 to 2mV typical	
Source Impedance		1Ω at 1 KHz, 8Ω at 1 MHz typical	
Ambient Temperature			
Operating		-10° C to +40° C	
Storage		-30° C to +70° C	
Power requirement	Four internal 1.5 V AA size batteries or external AC to 6 Vdc adaptor. Typical consumption 50 mA		
Dimensions	6.6" (168mm) x 2.4" (62mm) x 0.79" (20mm) excluding casing		
Weight	9.35 oz (265 gr) excluding batteries and casing		

Ordering Information

AP030	15 MHz differential probe 1:10 / 1:100
SI 9000	15 MHz differential probe 1:20 / 1:200
SI 9000A	15 MHz 1:50 / 1:500

All models are delivered with rubber casing. Batteries not included

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

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BENELUX	LeCroy BV	04902.8.9285
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy GmbH	06221.83.10.01
ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	(01235) 533114

Other sales and service representatives throughout the world.

Specifications subject to change without notice.

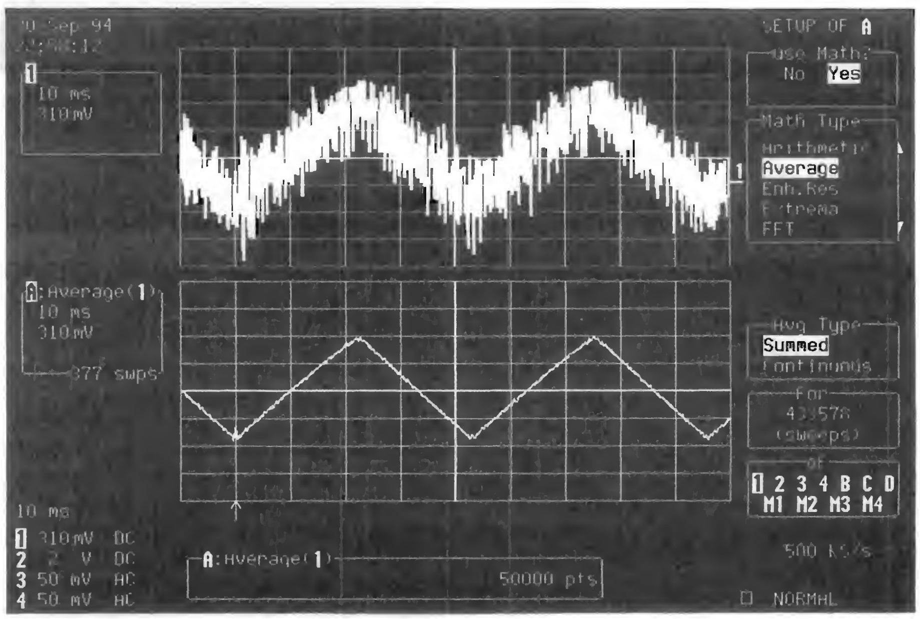
LeCroy

The Digital Scope Specialists

WP01 Waveform Processing Firmware for the 9300 Family of Digital Oscilloscopes

Main Features

- High–precision averaging up to 1 million sweeps
- Extended digital filtering capabilities
- Rescale function, with (ax + b) correction factor
- Envelope mode
- Integration
- Differentiation
- Log(e) and Log(10)
- Exp(e) and Exp(10)
- Absolute, Reciprocal
- Square, Square root
- Powerful function chaining feature



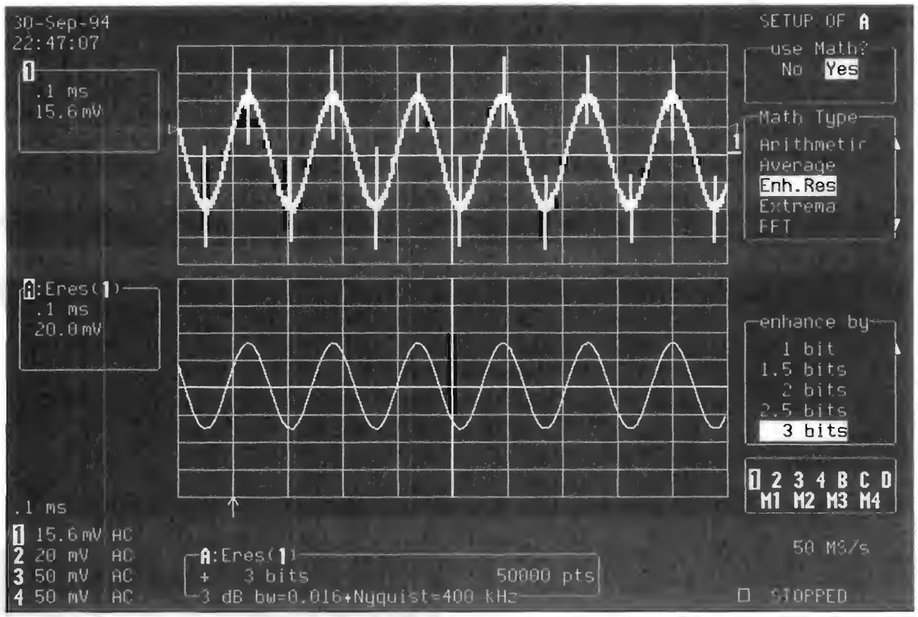
Summed Averaging is applied to the signal in Channel 1, to remove random noise. Trace A shows the result after 377 sweeps: the noise has practically disappeared.

The LeCroy WP01 Waveform Processing package features a powerful toolset that extends the processing power inside the 9300 oscilloscope, well beyond the capabilities of a traditional instrument.

In fact, all the processing is built-in to eliminate the need for external computers and controllers. High-speed microprocessors are used to ensure real-time updates of computed waveforms on the screen.

The package is fully programmable over GPIB or RS-232-C interfaces, and hard copies can be made directly on to a wide range of printers (including the optional internal printer), plotters or graphic formats.

Features and Benefits



High-frequency glitches in Channel 1 have been dramatically reduced in Trace A by using the low-pass filtering properties of the Enhanced Resolution Function.

EXTENSIVE SIGNAL AVERAGING

WP01 offers two powerful, high-speed averaging modes that can be used to reduce noise and improve the signal-to-noise ratio. Vertical resolution can be extended by several bits to improve dynamic range and increase the overall input sensitivity to as much as 50 µV/div.

Summed averaging, where up to 1,000,000 sweeps are repeatedly summed, with equal weight, in a 32-bit accumulation buffer for improved accuracy. The accumulated result is then divided by the number of sweeps.

Continuous/exponential averaging where a weighted addition of successive waveforms can be performed with weighting factors from 1:1 to 1:1023. The averaging goes on indefinitely with the contribution of "older" sweeps gradually decreasing. The method is particularly appropriate to reduce noise on signals drifting very slowly in time or amplitude.

ENHANCED RESOLUTION BY DIGITAL FILTERING

Allows low-pass F.I.R. filtering of the digitized signals, with 6 different cut-off frequencies per sampling rate setting. As a result, the vertical resolution of the captured signals – single-shot or repetitive – increases from 8 bits to 11 bits in 0.5-bit steps. This feature is ideal to strip off unwanted high-frequency noise on transient events.

RESCALING

Allows an input signal to be rescaled using a (ax + b) correction factor to compensate for gain and offset. This is very useful when dealing with various types of transducers, to read the correct temperature or pressure value directly from the scope's cursor.

ENVELOPE MODE

Shows the signal envelope by retaining only the highest and lowest amplitudes for every sampling interval, over a user-definable number of sweeps. Ideal to visualize the time or amplitude jitter in a signal.

POWERFUL MATH TOOLSET

In addition to the basic arithmetic functions found in the standard models (+,–,×,÷), WP01 adds an impressive set of functions such as integration, differentiation, logarithms and exponential – in both bases 10 and e – square, square root, reciprocal, absolute, and a sin(x)/x interpolation function.

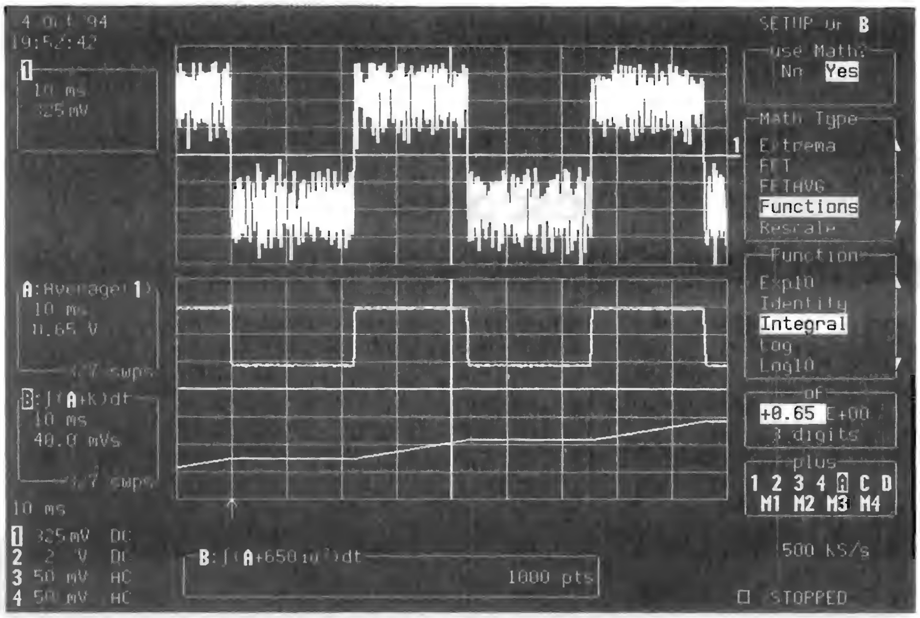
All these functions are updated automatically each time a new waveform is acquired, showing a "live" representation of a computed trace. This would be impossible to achieve on a separate computer.

FUNCTION CHAINING

When more than one math function is needed in the equation, WP01 supports function chaining, and allows the user to multiply, for instance, the "Voltage" and the "Current" channel and to integrate the result to get an instantaneous energy curve.

REMOTE CONTROL

All of the waveform processing can be controlled via GPIB or RS-232-C remote control. And the function traces do not even need to be called up on screen to be updated, an important feature that speeds up the computation.



To illustrate WP01's function chaining ability, the noisy signal in Channel 1 has been averaged in Trace A to remove undesired noise, and the result integrated in trace B.

WP01 Specifications

GENERAL

Max. number data points: only limited by the available amount of system memory (indicated in the "memory used" status menu).
Min. number data points: Data points can be reduced down to 50 in the processing function to improve update rate.
Vertical Zoom: supported, 50× maximum.
Horizontal Zoom: supported, maximum zooming to a point where 50 samples of the source trace occupy the full screen.
Maximum Sensitivity: 50 µV/div after vertical expansion.

SUMMATION AVERAGING

Number of Sweeps: 1 to 1,000,000.
Speed: up to 200,000 points/s.

CONTINUOUS AVERAGING

Possible Weighting Factors: 1:1, 1:3, 1:7, 1:15, 1:31, 1:63, 1:127, 1:255, 1:511 and 1:1023.

ENHANCED RESOLUTION

Choice of six low-pass filters to improve vertical resolution improvement from 8 to 11 bits in 0.5-bit steps.
Resulting bandwidth:

0.5 bit	0.5 × Nyquist BW
1 bit	0.241 × Nyquist BW
1.5 bit	0.058 × Nyquist BW
2 bit	0.029 × Nyquist BW
2.5 bit	0.016 × Nyquist BW

Nyquist BW = 1/2 × sample frequency.

RESCALE

ax + b rescaling with a and b ranging from ±0.00001 E-15 to ±9.99999 E+15

ARITHMETIC

Addition, subtraction, multiplication and ratio on any two waveforms.

FUNCTIONS

Identity, negation, integration (including additive constant), differentiation, square, square root, logarithm and exponential (base e and 10), sin x/x, reciprocal and absolute value of any waveform.

EXTREMA

Shows the signal envelope by retaining only the highest and lowest amplitudes for every sampling interval. Logs all extreme values of a waveform over a programmable number of sweeps. Maxima and minima can be displayed together, or separately by choosing *roof* or *floor* traces.
Number of Sweeps: 1 to 1,000,000.

FUNCTION CHAINING

Up to four functions can be automatically chained using traces A, B, C and D. Using memories M1 to M4 for intermediate results, any number of operations can be chained manually or via remote control.

REMOTE CONTROL

All controls and waveform processing functions are fully programmable using simple commands over the oscilloscope's GPIB or RS-232-C interfaces.

LeCroy
The Digital Scope Specialists

WP02 Spectrum Analysis Firmware for the 9300 Family of Digital Oscilloscopes

Main Features

- Frequency range from DC up to the instrument's full bandwith
- Simultaneous FFTs on up to 4 channels
- Frequency resolution down to 100 µHz
- Frequency domain averaging
- Wide selection of scaling formats
- 5 window functions
- Up to 5 1000-point FFTs per second
- Full support of cursors and automatic waveform parameters
- Full PASS/FAIL testing support

Adding the WP02 Spectrum Analysis Package to the 9300 family of digital oscilloscopes provides a fast and economical solution to frequency domain applications.

The WP02 Spectrum Analysis package provides the 9300 oscilloscope with a powerful frequency-domain toolset that extends its processing capabilities, well beyond the realm of a standard instrument. In fact, all the processing is built-in to eliminate the need for external computers and controllers.

High-speed microprocessors are used to ensure real-time update of computed waveforms on the screen. Fast Fourier Transforms (FFTs) rapidly convert time domain waveforms into frequency domain records to reveal valuable spectral information such as phase, magnitude and power.

The package is fully programmable over GPIB and RS-232-C interfaces, and hardcopies can be made directly on to a wide range of printers (including the optional internal printer), plotters or graphic formats.

Features and Benefits

WHY FFT IN A SCOPE?
The FFT package on a LeCroy 9300 has at least four clear advantages over common swept spectrum analyzers:

- It can show the spectrum of a **transient signal**.
- Both **time and frequency** information can be monitored **simultaneously**.
- Phase information is **available**.
- The price is **attractive**.

It has two definite advantages over FFT analyzers:

- It can show higher-frequency components.
- Both **time and frequency** information can be monitored **simultaneously**.
- The price is **attractive**.

BROAD SPECTRUM COVERAGE
The frequency spectrum ranges from DC to the full bandwidth of the oscilloscope for repetitive signals, and to one half of the maximum sampling frequency for transients.

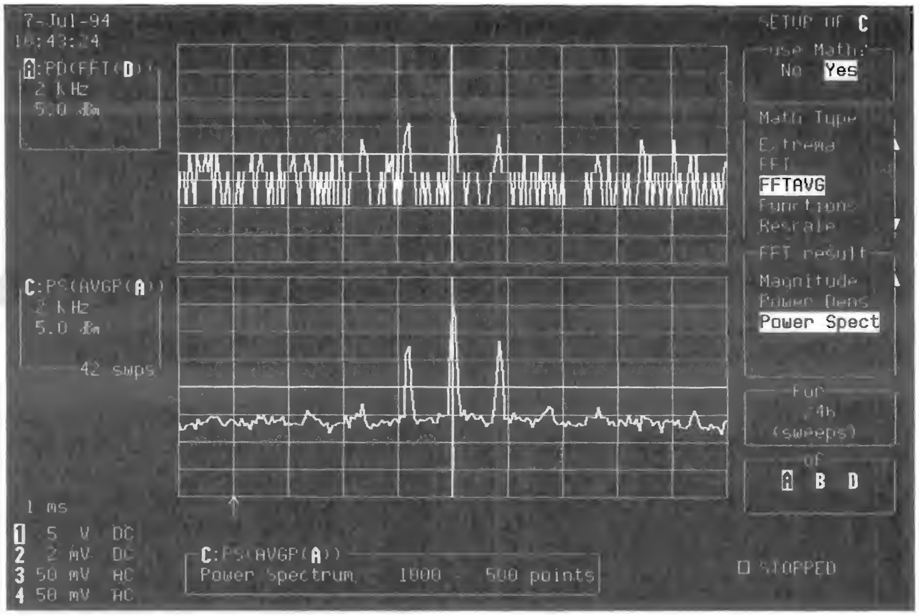
MULTI-CHANNEL ANALYSIS
All input channels can be analyzed simultaneously to look for common frequency-domain characteristics in independent signals.

VERSATILE SCALING FORMATS
Frequency-domain data may be presented as magnitude, phase, real, imaginary, complex, log-power and log-PSD (Power Spectral Density).

STANDARD WINDOW FUNCTIONS
Use rectangular for transient signals; von Hann (Hanning) and Hamming for continuous waveform data; Flattop for accurate amplitude measurements; Blackman-Harris for maximum frequency resolution.

FREQUENCY DOMAIN AVERAGING
Up to 50,000 FFT sweeps may be averaged to reduce base-line noise, enable analysis of phase-incoherent signals or signals which cannot be triggered on.

FREQUENCY CURSORS AND WAVEFORM PARAMETERS
Cursors can be set on the FFT trace to show up to 0.004% frequency resolution (up to 0.002% for 10,000 point memory) and measure power or voltage differences to 0.2% of full scale. Automatic waveform parameters can also be applied to FFT traces.



An FFT (top trace) with spectral components buried in noise. By applying the power averaging function (lower trace), all the baseline noise is removed, and the spectral components of an AM signal are clearly visible..

PASS/FAIL TESTING ON FFT TRACES
PASS/FAIL testing is fully supported on FFT traces. The instrument can be setup to test incoming spectra against tolerance masks. In case the signal "fails", the instrument can be programmed to perform a choice of actions (screen dump, waveform storage, pulse out, etc.)

RESCALING
Allows an input signal to be rescaled using a (ax + b) correction factor to compensate for gain and offset. This is very useful when dealing with various types of transducers, to read the correct temperature or pressure value directly from the scope's cursor.

FUNCTION CHAINING
When more than one math function is needed in the equation, WP02 supports function chaining, and allows the user to multiply, for instance, the "Voltage" and the "Current" channel and to integrate the result to get an instantaneous energy curve.

REMOTE CONTROL
All of the waveform processing can be controlled via GPIB or RS-232-C remote control. And the function traces do not even need to be called up on screen to be updated, an important feature that speeds up the computation.

FOURIER PROCESSING
Fourier processing is a mathematical technique which enables a time-domain waveform to be described in terms of frequency-domain magnitude and phase, or real and imaginary spectra. It is used, for example, in spectral analysis where a waveform is sampled and digitized, then transformed by a Discrete Fourier Transform (DFT). Fast Fourier Transforms (FFT) are a set of algorithms used to reduce the computation time (by better than a factor of 100 for a 1000 point FFT) needed to evaluate a DFT.

WP02 Specifications

GENERAL

Max. number data points: only limited by the available amount of system memory (indicated in the "memory used" status menu).

Min. number data points: Data points can be reduced down to 50 in the processing function to improve update rate.

Vertical Zoom: supported, 50× maximum.

Horizontal Zoom: supported, maximum zooming to a point where 50 samples of the source trace occupy the full screen.

Maximum Sensitivity: 50 µV/div after vertical expansion.

Frequency Range:

Repetitive signals: DC to instrument bandwidth.

Transient signals: DC to 1/2 maximum single-shot sampling frequency

Frequency Scale Factors: 0.05 Hz/div to 0.2 GHz/div in a 1-2-5 sequence.

Frequency Accuracy: 0.01%.

AMPLITUDE AND PHASE

Amplitude Accuracy: Better than 2%. Amplitude accuracy may be modified by the window function (see the window functions table).

Signal Overflow: A warning is provided at the top of the display when the input signal exceeds the ADC range.

Number of Traces: Time domain and frequency domain data can be displayed simultaneously (up to 4 waveforms).

Phase Range: -180° to +180° .

Phase Accuracy: ±5° (for amplitudes > 1.4 div).

Phase Scale Factor: 50° /division.

SPECTRUM SCALING FORMATS

Horizontal Scale: *Linear, in Hz*

Vertical Scales:

Power Spectrum *in dBm (1 mW into 50 Ω).*

Power Spectral Density *(PSD) in dBm.*

Magnitude, Real, Imaginary: *Linear, in V/div*

Phase Display: *Linear, in degrees.*

WINDOW FUNCTIONS

Rectangular, von Hann (Hanning), Hamming, Flattop and Blackman-Harris (see table below).

FFT EXECUTION TIMES*

100 points in less than 0.03 s.
1000 points in less than 0.3 s.
10000 points in less than 3 s.

** Only valid for 9350, 9360, and 9304/10 with MWP option. Other models, add 50%*

FREQUENCY DOMAIN POWER AVERAGING

Summation averaging of power, PSD or magnitude for up to 50,000 sweeps.

FUNCTION CHAINING

Up to four functions can be automatically chained using traces A, B, C and D. Using memories M1 to M4 for intermediate results, any number of operations can be chained manually or via remote control.

REMOTE CONTROL

All controls and waveform processing functions are fully programmable using simple commands over the oscilloscope's GPIB or RS-232-C interfaces.

FILTER PASS BAND AND RESOLUTION

Window type	Filter bandwidth at -6 dB [freq. bins]	Highest side lobe [dB]	Scallop loss [dB]	Noise bandwidth [freq. bins]
Rectangular	1.21	-13	3.92	1.0
von Hann	2.00	-32	1.42	1.5
Hamming	1.81	-43	1.78	1.36
Flattop	1.78	-44	0.01	2.96
Blackman-Harris	1.81	-67	1.13	1.71

Filter Bandwidth at -6 dB characterizes the frequency resolution of the filter.
Highest Side Lobe indicates the reduction in leakage of signal components into neighboring frequency bins.
Scallop Loss is the loss associated with the picket fence effect.

LeCroy

The Digital Scope Specialists

CKTRIG hardware option for the 9350A family

Main Features

- High speed 500 MHz external clock input.
- 10 MHz external clock reference input.
- Edge trigger comparator output.
- BNC, rear-panel mounted connectors.

External clock

This feature allows the 9350A family oscilloscopes to be externally clocked up to 500 MS/s, enabling full phase control over the acquired signal. In addition, the sample rate can be fine-tuned to the exact speed required by the application.

External reference

The external reference allows the scope to be phase-synchronized to an external 10 MHz reference, either to match the stability of the external source or to phase lock the acquired signal.

Trigger comparator

The trigger comparator signal outputs a pulse for each valid edge-trigger condition on the trigger signal. An invaluable feature for event-counting applications.

Specifications

EXTERNAL CLOCK INPUT
Input signal requirements:

Amplitude: 800 mV p-p
Frequency range: DC to 500 MHz
Offset: 0 V

Input impedance: 50Ω.

The negative pulse width must imperatively be <u>less than</u> 5ns.

EXTERNAL CLOCK REFERENCE INPUT
Input signal requirements:

Amplitude: 800 mV p-p
Frequency range: 10 MHz ±5%
Offset: 0 V

Input impedance 50Ω.

TRIGGER COMPARATOR OUTPUT
The comparator operates in a 'time-over-threshold' mode and generates a pulse edge of the same polarity as the polarity of the selected triggering edge each time a valid EDGE TRIGGER condition is met on the trigger signal. The duration of the pulse will be equal to the time the trigger signal is above/ below the trigger level.

Note: This does not operate in SMART TRIGGER mode.

Output signal characteristics: ECL, 50Ω, series-terminated.

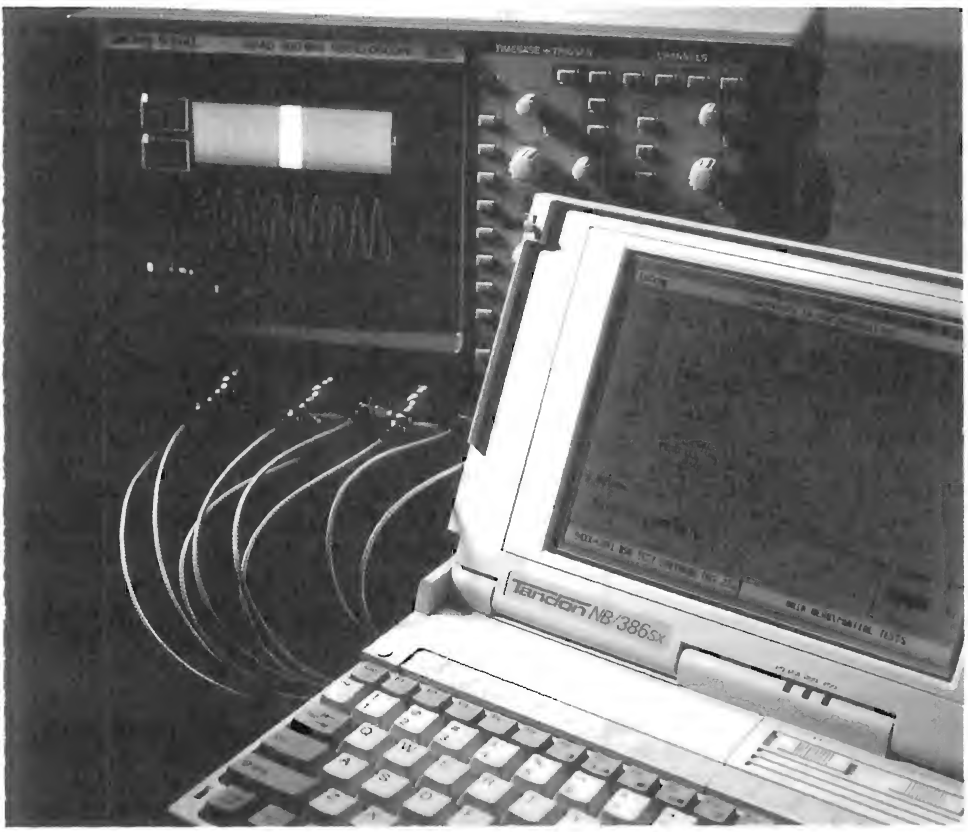
Ordering Information

935XA-CKTRIG	CKTRIG option for the 9350A oscilloscope family.
935XA-RKCKTRIG	Retrofit kit for the the 9350A oscilloscope family.

LeCroy

Innovators in Instrumentation

LeCalsoft–Calibration Software for LeCroy Digital Oscilloscopes



The LeCalsoft package enables a fast and thorough verification of all key specifications.

Main Features

- **Traceability to reference standards**
- **Computer check of key specifications**
- **Computer–aided readjustment**
- **Fully automated configurations available**
- **Supports all 93XX and 94XX models**
- **IBM® PC–AT compatible**

General

The LeCroy LeCalsoft (94XXCS05) test and calibration package provides a convenient, unambiguous check of LeCroy oscilloscopes. Designed for users who require traceability to reference standards (NIST, etc.), this package is ideally suited for use in calibration laboratories where the oscilloscopes are checked at fixed intervals.

Results of the calibration check are fully documented on hard copy, or they can be archived on hard disk or diskette.

LeCalsoft works on any PC compatible with the IBM®–AT standard. It controls the oscilloscope and the calibration sources through a National Instruments® GPIB interface.

Features

Calibration Check

All the essential specifications of the Digital Oscilloscope, such as bandwidth, linearity, noise, trigger, timebase and effective–bit count are tested. Deviations from nominal values are calculated and displayed on the screen, printed, or archived on hard disk or diskette.

Comprehensive Documentation of the Test Results

At the end of each calibration check, two types of documentation are available: a long form printout which gives details of the results of all the tests executed, and states whether or not the results are within the specifications, and a short form printout which gives a summary of the test results.

Calibration Traceable to National Standards (NIST, etc.)

By using signal sources traceable to a standard, the calibration will be traceable to the same standard, provided the relevant documentation is maintained.

Manual and Automated Calibration Check

Both manual operation with computer assistance, and automated operation are possible. Automated operation requires programmable multiplexer and signal sources. See the list of supported devices below.

Assisted Adjustment of the Oscilloscope

A computer–aided adjustment procedure is also provided. By following instructions on the screen, the trained technician is guided through the adjustments required to correct the settings of the oscilloscope so that it is within the specifications.

Calibration Certificate

On request, LeCroy will perform calibration traceable to National Standard Organizations. Calibration certificates are provided as part of this service.

Functional Description

Calibration Practice

LeCroy oscilloscopes are auto–calibrating digital oscilloscopes and therefore do not require regular calibration like analog oscilloscopes. However, for users who require traceability to reference standards (such as those provided by the National Institutes of Standards and Technology), and for calibration laboratories which must inspect incoming instruments and perform recalibration at prescribed intervals, the LeCalsoft computer–aided test and calibration packages provide an easy solution.

Under guidance of the LeCalsoft program, some adjustments to the oscilloscope can be made by an electronics technician. However major deviations from specifications usually require repair by a trained service engineer. LeCroy regularly schedules training classes. If no in–house trained person is available, the nearest LeCroy service center can carry out repairs and calibration, and provide traceability to reference standards.

Using the LeCroy LeCalsoft Packages

For calibration checking, digital oscilloscopes have a great advantage over analog oscilloscopes because waveforms can be transferred to a host computer. This simplifies the calibration procedure enormously, makes it potentially faster and allows an extensive range of tests with unambiguous interpretation of the results.

LeCalsoft performs an extensive series of tests which verify the specifications of the oscilloscope. It includes many tests relevant to analog scopes such as Noise and Linearity tests. Although these tests are difficult and time consuming on an analog oscilloscope, they can be computer controlled and are quickly and easily performed on a digital oscilloscope. Tests which are specific to digital oscilloscopes, such as Sinefit tests are also included.

The various test options in LeCalsoft are presented to the operator in the form of a simple menu system. The user has the choice of performing an automated calibration check of the oscilloscope, or individually testing any of the specifications. Some of the tests require the use of high–quality external signal generators. The user receives instructions on the screen when it is necessary to change the cable connections, but apart from this minor intervention, the tests are fully computer controlled when supported GPIB–programmable instruments are used.

Supported Instrumentation

LeCalsoft software works on any AT–compatible equipped with a math coprocessor and a National Instruments GPIB interface. Automated calibration checking is possible using a set of instruments from the following list. (For an automated calibration check, either the LeCroy or Keithley programmable multiplexer is required to feed the calibration signals to the oscilloscope input.)

RF sinewave generators:
- Marconi 2019A, 2022C, 2030, 2031
- Fluke 6060B, 6061A
- Hewlett–Packard 8642A, 8642B
- Rohde & Schwarz SMX

AF sinewave generators:
- Marconi 2019A, 2022C, 2030, 2031
- Hewlett–Packard 8642A, 8642B
- Rohde & Schwarz SMX
- Tektronix FG5010
- LeCroy AFG 9100

DC Precision Power Supply:
- Tektronix PS5004
- Datron 4708 Autocal Multifunction Standard

Fast Pulse Generator:
- Tektronix CG5001/CG551AP

Power Meters:
- Hewlett–Packard HP436A, HP437B

Multiplexers:
- Keithley 199 SYSTEM DMM/ SCANNER with LeCroy interface board.
- LeCroy 4951, 4973–1, 4973–2 Multiplexers.

Frequency standard:
- WWV or HBG1500

Recommended Accessories

A full kit of calibration connectors and interfaces is available from LeCroy. It includes all the necessary cables, adapters, splitters and filters, as well as the Programmable Multiplexer. Also available is a repair package including special tools, board extenders, etc., for computer–aided adjustment.

Use of Other Instruments

It is possible to perform the calibration check with some other unsupported signal sources. However, the user is then required to set up these instruments manually and to perform one measurement at a time. The LeCalsoft package guides the user step by step, and controls the oscilloscope data acquisition and the computation of the results.

LeCalsoft compares the signal measured by the oscilloscope with the signal it would expect to receive from the generator. Warning messages are displayed whenever tolerances are exceeded. Some of the adjustments may be carried out by the user when the test sequence is finished. In this case, the software will guide the user through the correct adjustment procedure. At the end of the calibration check, a printout can be generated to list the results.

Specifications

Computer Required: Any PC compatible with the IBM–AT standard, and equipped with a mathematical coprocessor and a National Instrument Inc. GPIB interface.

Operating System: DOS 3.0 upward

Medium: $3^1/_2$" 1.44 Mb
$5^1/_4$" 1.2 Mb diskette

Major Tests Supported by LeCalsoft

Internal

To ensure proper calibration of the oscilloscope, internal auto–calibration tests are automatically executed during normal operation. This standard sequence of internal auto calibration tests is initiated by the software and the results are transferred to the PC for analysis.

The tests are:

- Calibration of the resolution of the time–to–digital converter with respect to the system clock
- Determination of the gain constants of the input amplifiers
- Offset compensation versus gain variation
- Global internal non–linearity
- General functionality check

Bandwidth

To calculate the bandwidth, the amplitudes of sine waves of increasing frequencies are measured. The sine wave generator is first set to 500 kHz with an amplitude 75% of full screen, i.e. ±3 vertical divisions. The frequency is then swept up to the point where an amplitude drop of 3 dB is observed. This indicates the bandwidth.

This test is executed on all channels for 1 MΩ and 50 Ω input impedance and for all vertical sensitivities. It requires a sine wave generator with good flatness.

Generators supported under program control are listed on page 2.

Linearity

15 different known voltages, varying from 5% to 95% of full screen, are applied by the external voltage reference source. For each voltage value, a full waveform is acquired, and the mean value is compared to the known input voltage. The linearity is determined through a linear regression fit to the 15 measurements.The slope, the offset and the chi–square of the fit are computed.

With the linearity test, many other related tests are performed: response time of the overload protection of the 50 Ω input, linearity of the variable gain calibration, range and linearity of the offset setting, and quality of the input coupling.

This procedure is executed on all channels for both 1 MΩ and 50 Ω input impedance. The test requires a DC source with a precision and time stability of 0.1%, a voltage range of 0 V to 20 V adjustable in steps of 5 mV, and an output current capability of 300 mA.

Power supplies supported under program control are listed on page 2.

Noise

The noise tests are executed on all channels for both 1MΩ and 50 Ω input impedance, with AC and DC coupling, five different time–base settings, and open inputs. Full waveforms are acquired with different offset values. The peak–to–peak as well as the RMS values of each measurement are computed, and the maximum values are recorded. The program also indicates the occurrence of any "flyers", i.e. short noise peaks generated by the ADC's.

The noise tests also include:

- checking the linearity of the variable offsets of all channels between 2.5% and 97.5% of full screen.
- checking the stability of the ground line when switching the inputs between GROUND and DC coupling modes.

Rise time/Overshoot

Executed on all channels for both 1MΩ and 50 Ω input impedance, these tests measure the rise time of the oscilloscope response to the input voltage step, as well as the amount of pre–shoot and overshoot. They require a voltage step generator with calibrated fast rise–time amplitude.

The Voltage Step Generator supported under program control is the Tektronix CG5001.

Sinefit

The performance of the analog–to–digital converter is evaluated in terms of the number of effective bits (a measure of the signal–to–noise ratio). It is measured on all channels, at a sensitivity of 50 mV/div., by applying a pure sine wave at varying frequencies and timebase settings

This test is a measurement of dynamic linearity. It shows the effect of such errors as noise, non–linearities and aperture jitter.

Timebase

The timebase test compares the internal clock with a very precise and stable external timebase reference (clock generator) such as the WWV standard or HBG 1500.

Trigger

The trigger capabilities are tested for all possible configurations. These include:

- Internal and external trigger sources
- DC, AC, HF–reject, and LF–reject couplings
- Trigger level settings in all slope modes.

ORDERING INFORMATION

LeCalsoft and Options

94XXCS05 Complete LeCalsoft for 93XX and 94XX (software and hardware), incl. cables, switch card, adapters, etc.
94XXCS01 LeCalsoft software for 93XX and 94XX
9400CS01 Calsoft software for 9400A

LeCalsoft Accessories

93XXKCS02 Calibration kit for 93XX and 94XX
9400KCS02 Calibration kit for 9400A

Individual system components available on request

U.S. REGIONAL SALES OFFICES 1 800–5–LeCroy (1–800–553–2769):

automatically connects you to your local sales office.

LeCroy has sales engineers in most major metropolitan areas, coordinated through a system of five Regional Sales and Service Offices:

NORTHEAST: 700 Chestnut Ridge Rd, Chestnut Ridge, NY 10977

SOUTHEAST: 410 Ware Blvd Ste 716, Tampa, FL 33619

FARWEST: 5912 Stoneridge Mall Rd Ste 150, Pleasanton, CA 94588

CENTRAL:

Midwest: 4811 S 76th St Ste 415, Greenfield, WI 53220

Southwest: 14800 Central Ave SE Albuquerque, NM 87123

WORLDWIDE

Argentina: Search SA, (01) 394–5882
Australia: Scientific Devices Pty Ltd, (03) 579–3622
Austria: Dewetron GmbH, (0316) 391804
Benelux: LeCroy BV (0031) 4902–89285
Brazil: ATP–Hi–Tek, (011) 421–5477
Canada: LeCroy Canada Inc, (514) 928–4707
Denmark: Lutronic, (42) 459 764
Eastern Europe: Elsinco GmbH, Vienna, 222 812 1751
Finland: Labtronic OY, (80) 847 144
France: LeCroy Sarl (1) 69 073 897
Germany: LeCroy GmbH, (06221) 831001
Greece: Hellenic S/R Ltd., (01) 721 1140
Hong Kong: Euro Tech (Far East) Ltd, (052) 814–0311
India: Electronic Ent, (022) 4137096
Israel: Ammo, (03) 453157
Italy: LeCroy Srl, Roma (06) 300.97.00 or 331 31 46; Milano (02) 2940 5634
Japan: LeCroy Japan, Tokyo (0081) 33 376 9400; Osaka (0081) 6 330 0961
Korea: WOOJOO Hi–Tech Corp, (02) 449–5472
Mexico: Nucleoelectronica SA, (05) 5593 6043
New Zealand: E.C. Gough Ltd, (03) 798–740
Norway: Avantec AS (02) 630520
Pakistan: Electronuclear Corp, (021) 418087
Portugal: M.T. Brandao, Lta, (02) 815680
Singapore: Sing. Electr. and Eng. Ltd (65) 481–8888
S. Africa: Westplex Test & Meas. (011) 787 0473
Sweden: MSS AB, (0764) 68100
Switzerland: LeCroy SA (064) 51 91 81
Taiwan: Topward El.Inst., Ltd, (02) 601 8801
Thailand: Measuretronix Ltd, (02) 374 2516
United Kingdom: LeCroy Ltd, (0235) 533 14

LeCroy
Innovators in Instrumentation

LeCROY CORPORATE HEADQUARTERS
700 Chestnut Ridge Road
Chestnut Ridge, NY 10977–6499
Phone: (914) 425–2000
TWX: (710) 577–2832
Fax: (914) 425–8967

LeCROY EUROPEAN HEADQUARTERS
2, rue du Pré–de–la–Fontaine
P.O.Box 341
1217 Meyrin 1 – Geneva, Switzerland
Telephone: (022) 719–21–11
Fax: (022) 782–39–15

SECTION 3 Block Diagram and Sub-Assemblies

3.1 9354A, 9354AM & 9354AL Sub-Assemblies

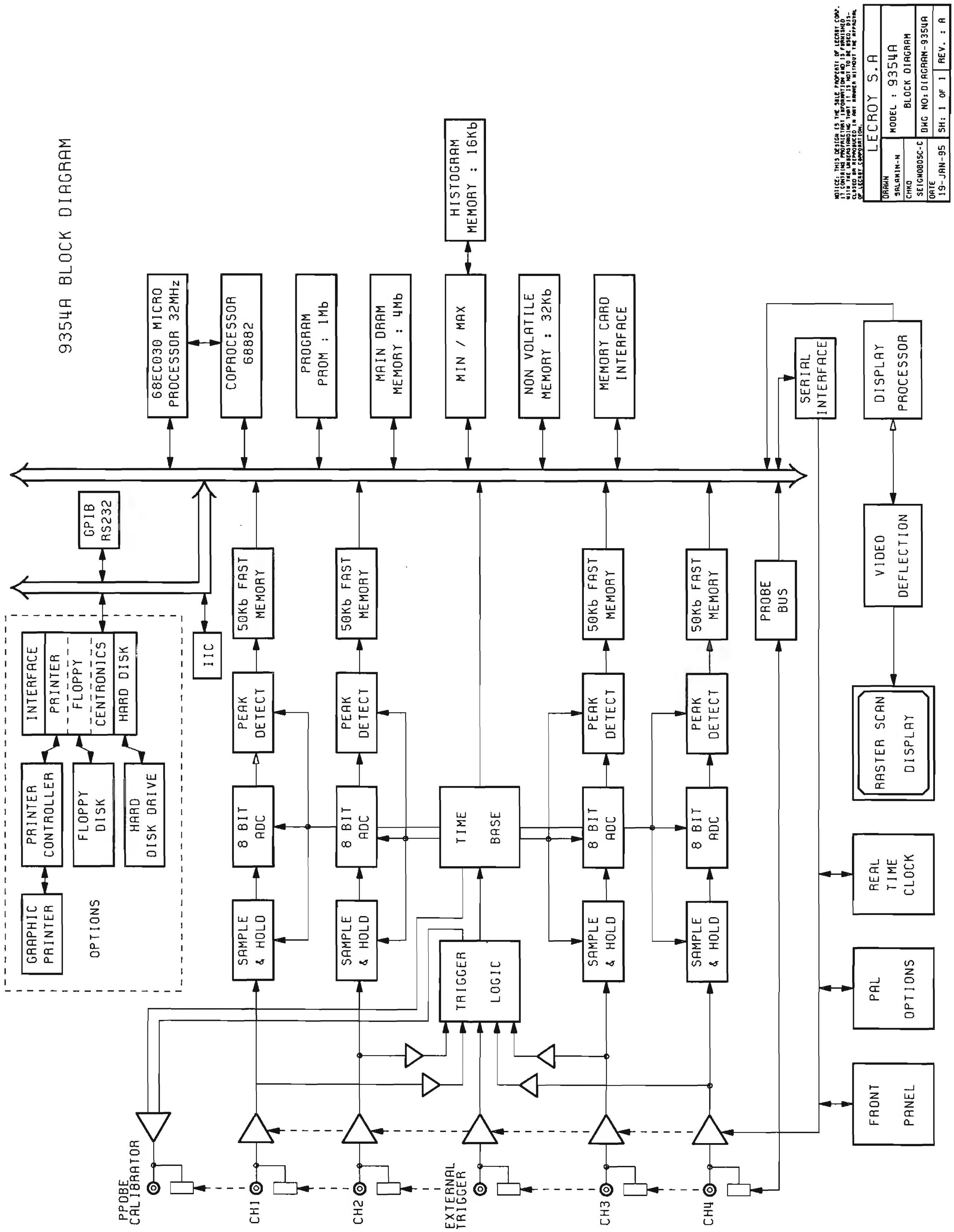
F9302-1-4	Processor, 4 Mbyte RAM for 9354A
F9302-1-8	Processor, 8 Mbyte RAM for 9354AM
F9302-1-16	Processor, 16 Mbyte RAM for 9354AL
F9350-21	Acquisition Memory, 2 X 50 K for 9354A
F9350M-21	Acquisition Memory, 2 X 250 K for 9354AM
F9350L-2	Acquisition Memory, 2 X 2 MB for 9354AL
F9354-31	Main card, Quad 500 MHz, 500 MS/s, Front end, ADC, Time base
F9300-4	GPIB + RS232 interface
F9354-5	Quad channel front panel
PS9351	Power supply +/- 5V, +/- 15V.
93XX-Display	Video, deflection, CRT, yoke
M935X	Mechanical for 9354A/M/L series

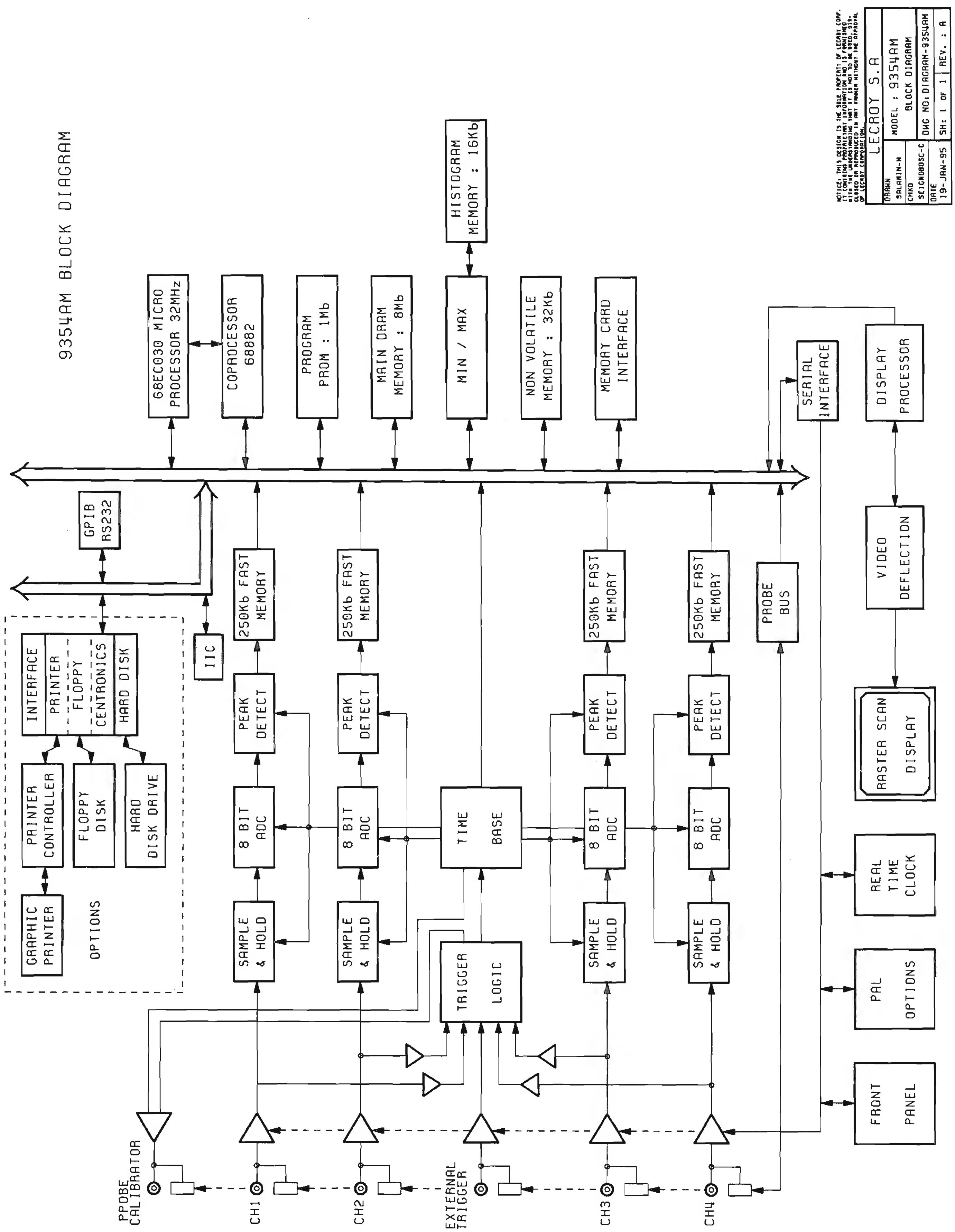
3.2 9354T & 9354TM Sub-Assemblies

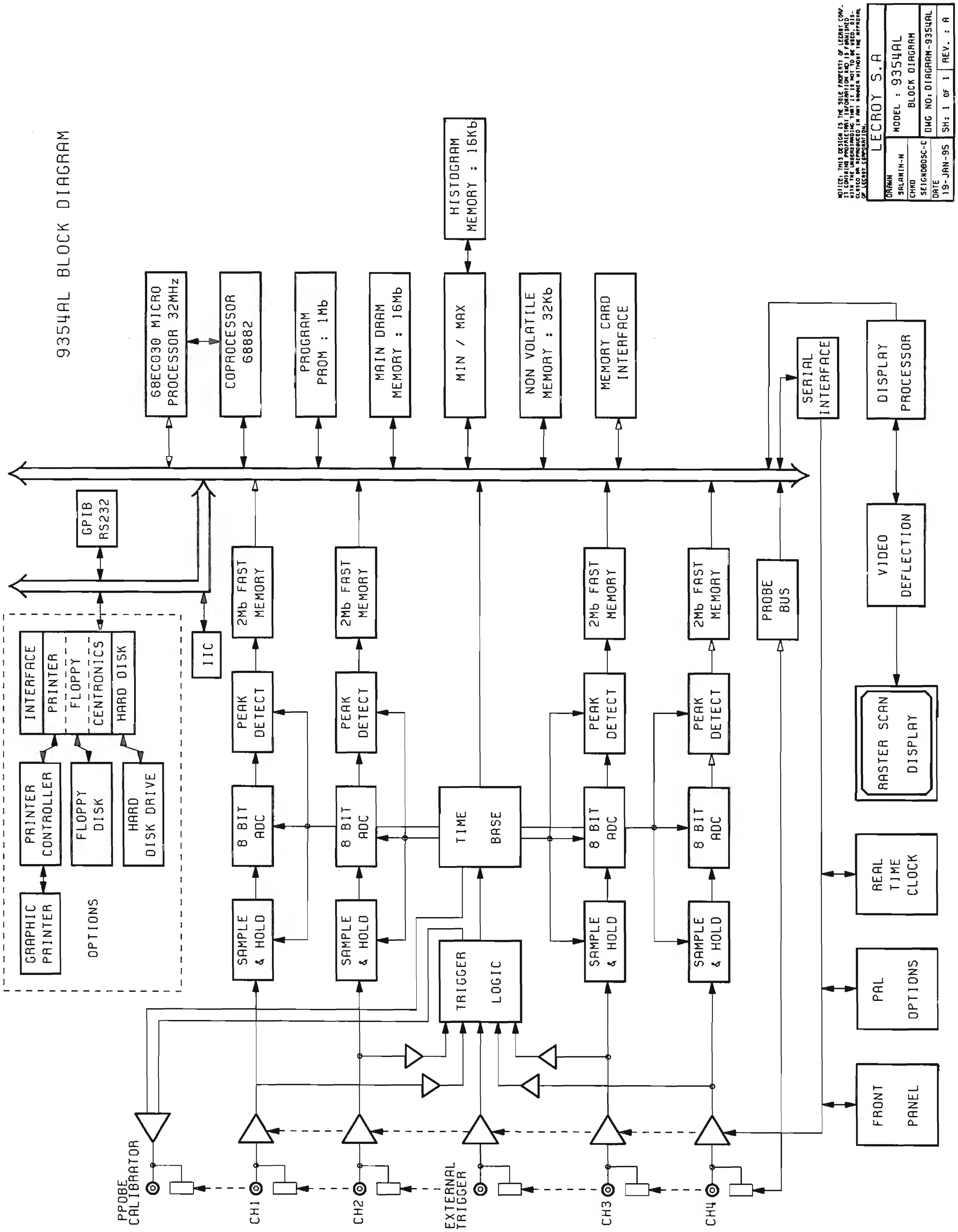
F9302-1-4	Processor, 4 Mbyte RAM for 9354T
F9302-1-8	Processor, 8 Mbyte RAM for 9354TM
F9350T-21	Acquisition Memory, 2 X 100 K for 9354T
F9350TM-21	Acquisition Memory, 2 X 500 K for 9354TM
F9354-31	Main card, Quad 500 MHz, 500 MS/s, Front end, ADC, Time base
F9300-4	GPIB + RS232 interface
F9354-5	Quad channel front panel
PS9351	Power supply +/- 5V, +/- 15V.
93XX-Display	Video, deflection, CRT, yoke
M935X	Mechanical for 9354T series

3.3 9354A, 9354AM, 9354AL, 9354T & 9354TM Hardware Options

9354A-FDGP	Graphic Printer & Floppy Disk F9300-6 : Centronics, Floppy, Printer interface F9300-7 : Printer controller
9354A-GP01	Graphic Printer F9300-6 : Centronics, Floppy, Printer interface F9300-7 : Printer controller
9354A-FD01	Floppy Disk F9300-6 : Centronics, Floppy, Printer interface
9354A-HDD	Hard Disk Drive, 130 MB F9300-8 : PCMCIA III, Hard Disk Controller


9354A BLOCK DIAGRAM
LECROY S.A
DRAWN SALAMIN-N
CHKD SEIGNOBOSC-C
DATE 19-JAN-95
MODEL : 9354A
BLOCK DIAGRAM
DWG NO: DIAGRAM-9354A
SH: 1 OF 1
REV. : A
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 4Mb
HISTOGRAM MEMORY : 16Kb
MIN / MAX
NON VOLATILE MEMORY : 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
VIDEO DEFLECTION
RASTER SCAN DISPLAY
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
GPIB RS232
IIC
INTERFACE
PRINTER
FLOPPY
CENTRONICS
HARD DISK
PRINTER CONTROLLER
FLOPPY DISK
HARD DISK DRIVE
GRAPHIC PRINTER
OPTIONS
50Kb FAST MEMORY
50Kb FAST MEMORY
50Kb FAST MEMORY
50Kb FAST MEMORY
PROBE BUS
PEAK DETECT
PEAK DETECT
PEAK DETECT
PEAK DETECT
8 BIT ADC
8 BIT ADC
8 BIT ADC
8 BIT ADC
TIME BASE
SAMPLE & HOLD
SAMPLE & HOLD
SAMPLE & HOLD
SAMPLE & HOLD
TRIGGER LOGIC
PROBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4


9354AM BLOCK DIAGRAM
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 8Mb
HISTOGRAM MEMORY : 16Kb
MIN / MAX
NON VOLATILE MEMORY : 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
VIDEO DEFLECTION
RASTER SCAN DISPLAY
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
GPIB RS232
IIC
INTERFACE PRINTER FLOPPY CENTRONICS HARD DISK
PRINTER CONTROLLER
FLOPPY DISK
HARD DISK DRIVE
GRAPHIC PRINTER
OPTIONS
250Kb FAST MEMORY
PEAK DETECT
8 BIT ADC
SAMPLE & HOLD
TIME BASE
TRIGGER LOGIC
PROBE BUS
PROBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4
LECROY S.A
MODEL : 9354AM
BLOCK DIAGRAM
DRAWN SALAMIN-N
CHKD SEIGNOBOSC-C
DWG NO: DIAGRAM-9354AM
DATE 19-JAN-95
SH: 1 OF 1
REV. : A


9354AL BLOCK DIAGRAM
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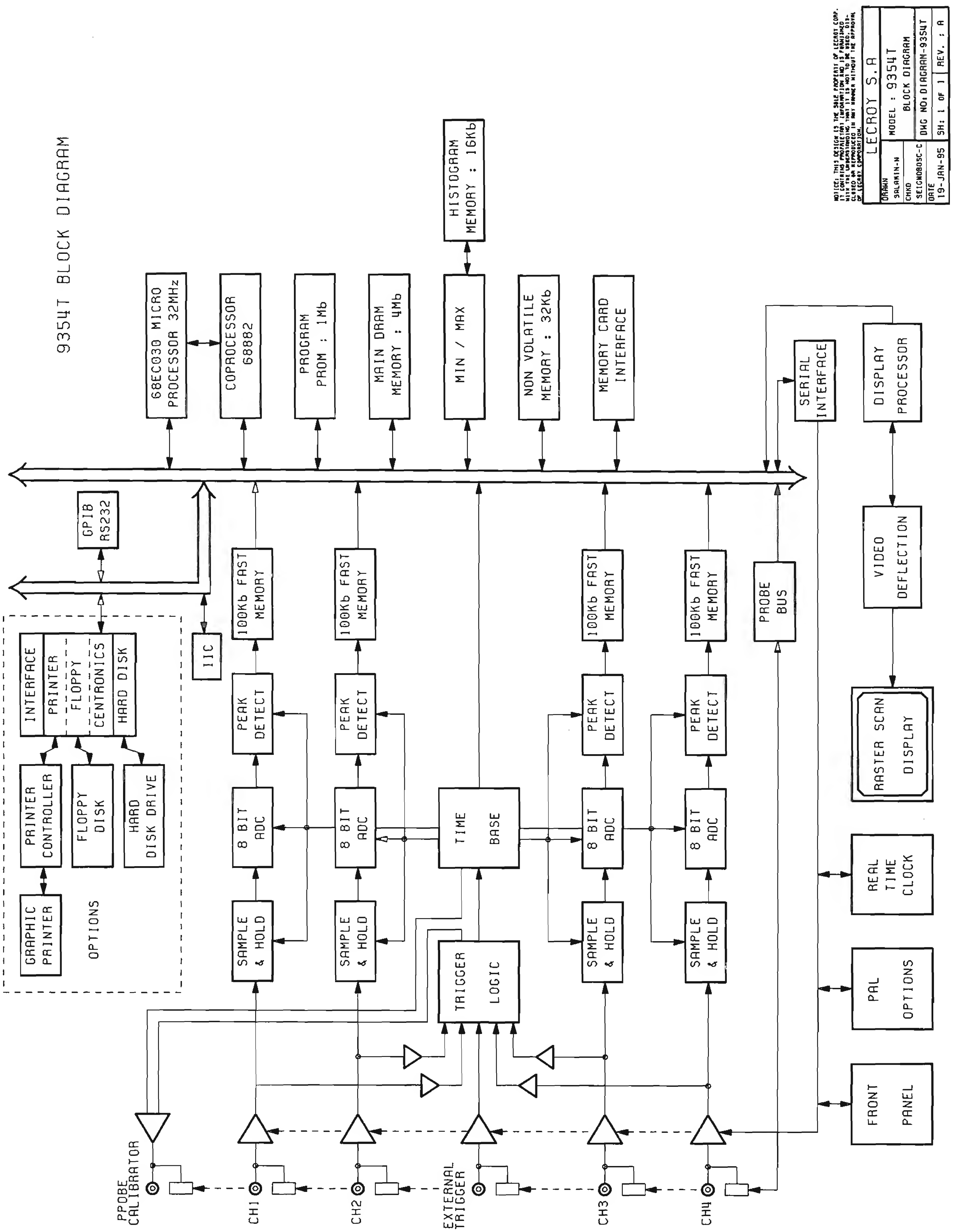
LECROY S.A
DRAWN SALAMIN-N
CHKD SEIGNOBOSC-C
DATE 19-JAN-95
MODEL : 9354AL
BLOCK DIAGRAM
DWG NO: DIAGRAM-9354AL
SH: 1 OF 1
REV. : A
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 16Mb
HISTOGRAM MEMORY : 16Kb
MIN / MAX
NON VOLATILE MEMORY : 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
GPIB RS232
IIC
INTERFACE
PRINTER
FLOPPY
CENTRONICS
HARD DISK
PRINTER CONTROLLER
FLOPPY DISK
HARD DISK DRIVE
GRAPHIC PRINTER
OPTIONS
2Mb FAST MEMORY
PEAK DETECT
8 BIT ADC
SAMPLE & HOLD
TIME BASE
TRIGGER LOGIC
PROBE BUS
VIDEO DEFLECTION
RASTER SCAN DISPLAY
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
PPOBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4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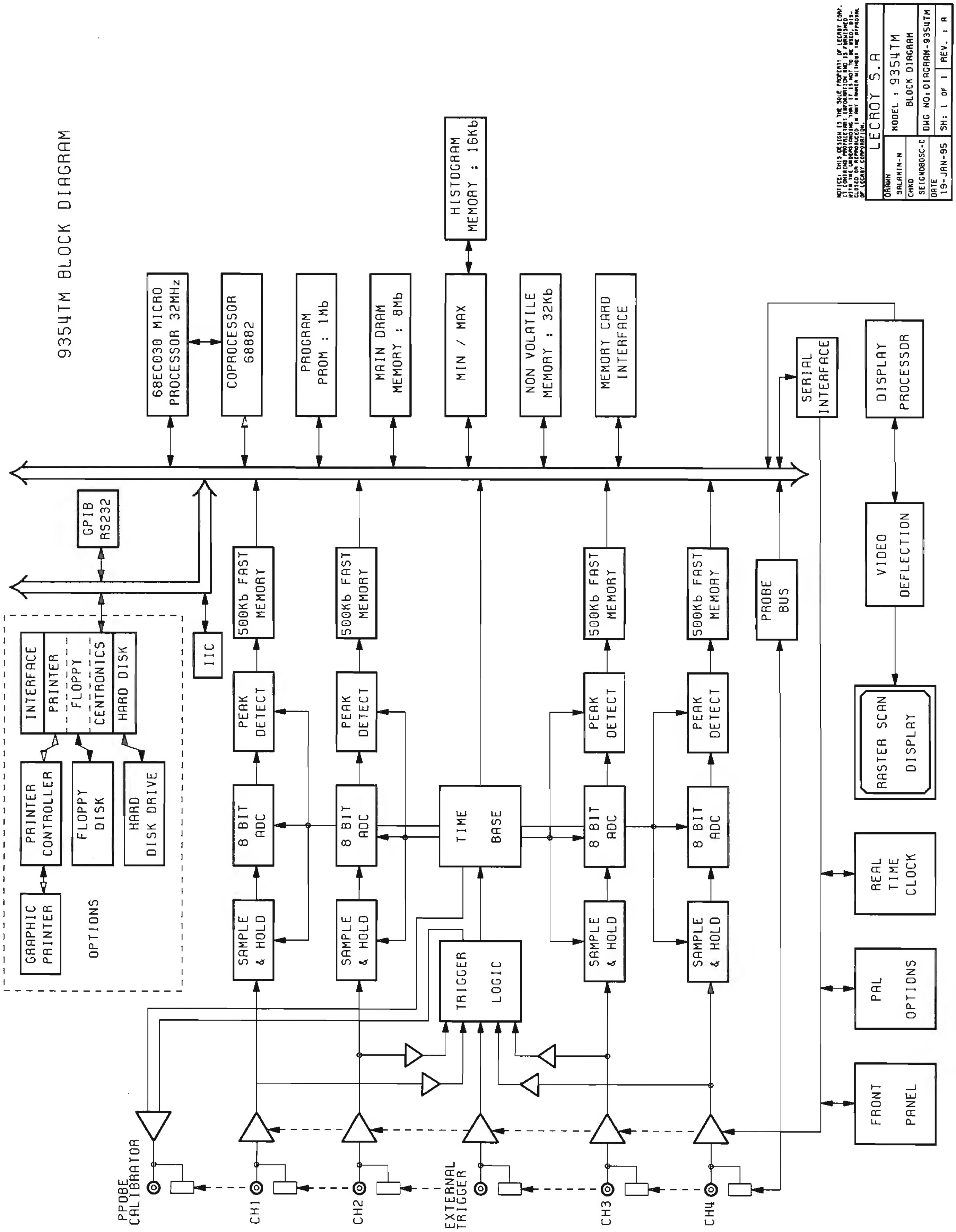
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 4Mb
MIN / MAX
HISTOGRAM MEMORY : 16Kb
NON VOLATILE MEMORY : 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
VIDEO DEFLECTION
RASTER SCAN DISPLAY
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
GPIB RS232
IIC
INTERFACE
PRINTER
FLOPPY
CENTRONICS
HARD DISK
PRINTER CONTROLLER
FLOPPY DISK
HARD DISK DRIVE
GRAPHIC PRINTER
OPTIONS
100Kb FAST MEMORY
PEAK DETECT
8 BIT ADC
SAMPLE & HOLD
TIME BASE
TRIGGER LOGIC
PROBE BUS
PROBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4
LECROY S.A
MODEL : 9354T
BLOCK DIAGRAM
DRAWN SALAKIN-N
CHKD SEIGNOBOSC-C
DWG NO: DIAGRAM-9354T
DATE 19-JAN-95
SH: 1 OF 1
REV. : A


9354TM BLOCK DIAGRAM
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COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 8Mb
MIN / MAX
HISTOGRAM MEMORY : 16Kb
NON VOLATILE MEMORY : 32Kb
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SERIAL INTERFACE
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8 BIT ADC
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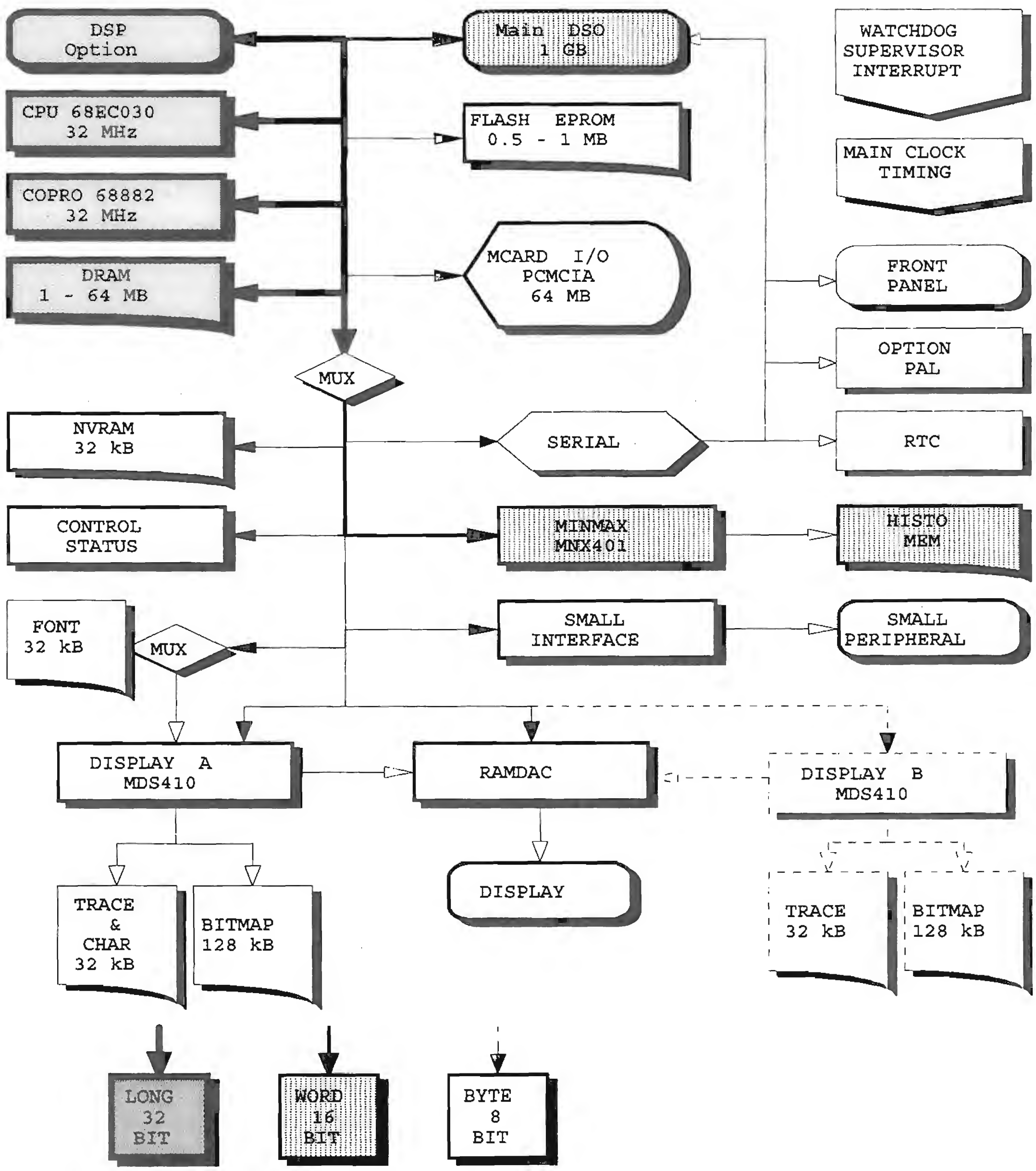
PROBE BUS
PROBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4
LECROY S.A
MODEL : 9354TM
BLOCK DIAGRAM
DRAWN SALAMIN-N
CHKD SEIGNOBOSC-C
DWG NO: DIAGRAM-9354TM
DATE 19-JAN-95
SH: 1 OF 1
REV. : A

SECTION 4 THEORY of OPERATION

4.1 Processor Board : F9302-1-4 for 9354A & 9354T, F9302-1-8 for 9354AM & 9354TM, or F9302-1-16 for 9354AL

This processor board is based on to the 68EC030 and 68882 coprocessor, with an internal clock frequency of 32 MHz, and 4 Mbytes or 8 Mbytes or 16 Mbytes memory.
The internal Data Bus is 32 bits wide (DRAM, DSP), the peripheral Data Bus set 8 or 16 bits, and the Address Bus has 32 bits (A0-A30 and A31 for the Min/Max.).

4.1.1 Processor Block Diagram



4.1.2 Parallel Peripherals

DRAM memory : Data bus 32 bits

The DRAM memory of 4 Mbytes or 8 Mbytes or 16 Mbytes (up to 64 Mbytes) is used as the program memory and working memory.
The compacted program of 1MByte stored within the Flash EPROM, IC of 8 Mbit is de-compacted, loaded and executed in the DRAM.

DSP interface : Data bus 32 bits.

An optional Digital Signal Processor is connected to the processor board via a 32 bits address bus.

F9354-31 main board interface : Data bus 16 bits.

The main board is connected to the processor via a 32 bits address bus.
See section 4.3.

Min/Max calculation : Data bus 16 bits.

A gate array MNX401 makes a histogram in its associated 16 Kbytes memory and remembers the minimum and maximum data values it sees.

Flash memory : Data bus 8 bits.

Segmented Flash EPROM of 1 Mbyte (IC of 8 Mbits) contains 16 Kbytes program, executable at power on, and other compacted programs executable in the DRAM.

Memory card : Data bus 8 bits.

An interface is implemented to support an external memory card, PCMCIA / JEIDA 4, type 68 pins, whose size can range from 16 Kbytes to 64 Mbytes, with the extension to support flash memory and I/O cards.

Graphic processor : Data bus 8 bits.

The graphic processor of the raster scan display is a gate array designated MDS410.

Clock frequency	:	48 MHz.
Trace and characters memory	:	32 Kbytes (SRAM).
Bitmap memory	:	128 Kbytes (BMRAM).
Character font	:	32 Kbytes (SRAM).

Non volatile memory : Data bus 8 bits.

A static RAM of 32 Kbytes (IC of 256 Kbits) contains the parameters used at power on to initialize the scope and the stored panels parameters. This memory is battery backed up

DAC command of the display intensity : Data bus 8 bits.

The control of the display intensity is done by a RAMDAC, up to 8 traces.

Status and command registers : Data bus 8 bits.

Status (read) and command (write) registers of 12 bits address, control the memory card and front panel interface during the boot process or after a RESET.

4.1.3 Serial Peripherals

The processor controls the digital and analog section with a dual serial controller.

DAC's registers (read/write)
Front panel registers (68HC05C4)
RTC registers (68HC68T1)
Probe detection
Software options (GAL)
Front end control
Trigger control (MTR408)

Real time clock

Integrated circuit 68HC68T1 (Motorola or RCA).

Resolution	: 1 sec to 99 years.
Clock frequency	: 32.768 KHz.
Non volatile memory	: 32 Kbytes.
Data & Address bus	: 8 bits.
Interrupt level	: 5.

4.1.4 External Interfaces

Serial RS232 interface and Parallel GPIB interface.
See F9300-4 description, section 4.4.

4.1.5 Optional Interfaces

Graphic Printer	: F9300-6 interface and F9300-7 printer controller. Internal graphic printer
Floppy Disk Drive	: F9300-6 interface 1.44 Mbytes floppy
Centronics Printer	: F9300-6 interface
Hard Disk Drive	: F9300-8 PCMCIA III controller, 130 Mbytes hard disk

4.2 F9354-31 Main Board

4.2.1 Introduction

The board is divided into five sections :

- Microprocessor control.
- Front-end
- Trigger
- Analog to Digital Converter
- Time base

4.2.2 Microprocessor Control

See block diagram, page 4.6

4.2.3 Front End

The front end system provides the signal conditioning for the ADC system.
The main functions are :

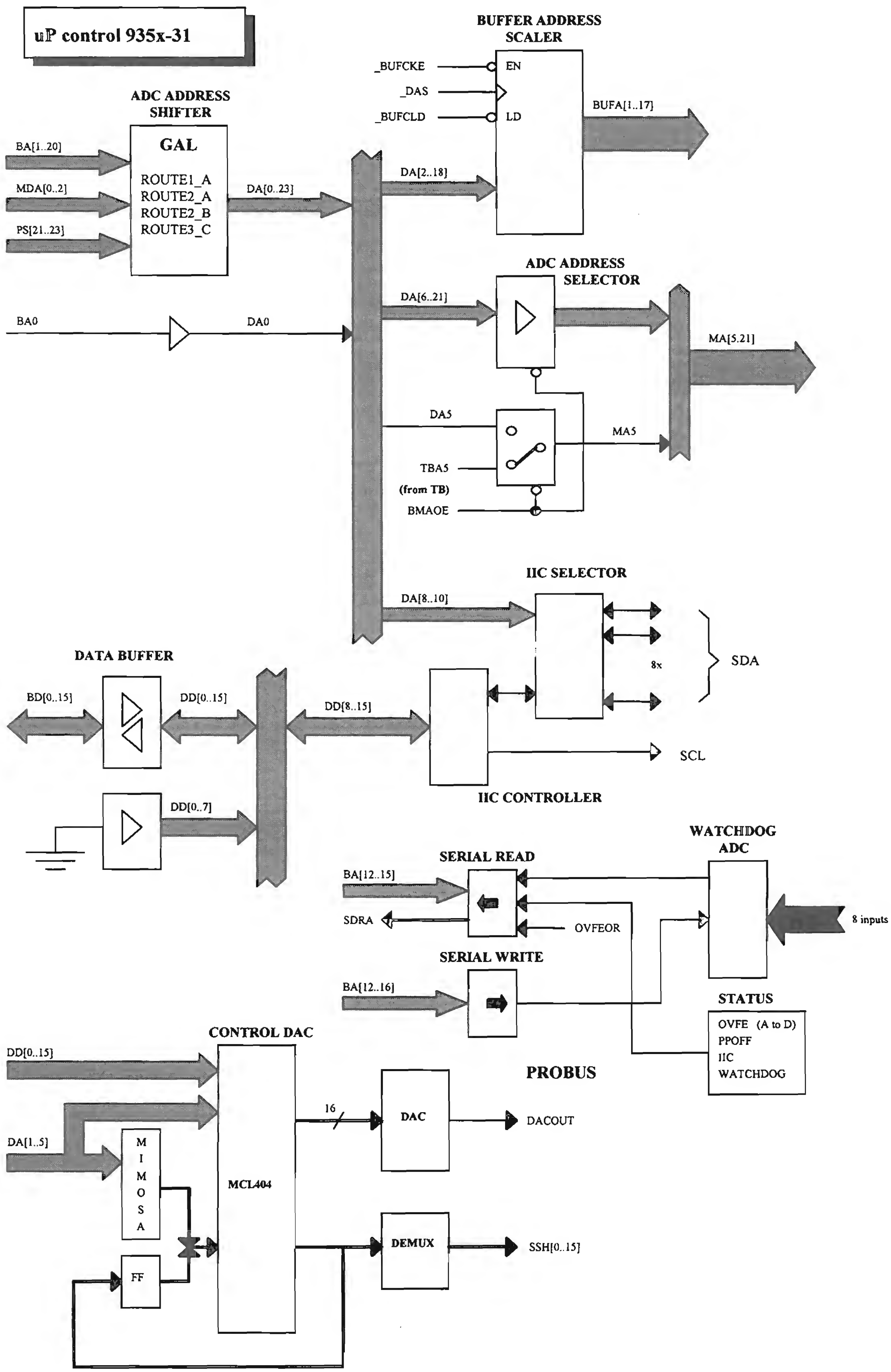
- four channels operation, calibration with Software control
- input protection and coupling : AC, DC, 1 MΩ, 50 Ω
- amplitude normalisation for the ADC system : 320 mV full scale
- fine gain control
- offset control
- bandwidth limit filter : BWL 30 MHz
- triggering with standard coupling and TV trigger on four channels and External

4.2.3.1 Channel Description

The four channels are identical, thus only one channel will be described for brevity.

- Input coupling and protection : Relay RL1 (_CAL) connects the front-end input to the calibration source and disconnects the BNC which is then terminated on a 1 MΩ high impedance. Switch SW1 (VCAL/10) selects between a divide by 4 or a divide by 40 for the DC calibration signal. Relay RL2 (_HZ) sets the 1 MΩ/50 Ω coupling. A diode circuit senses the temperature of the 50 Ω termination resistor and sets the _OVL status bit low if overheating is detected. The BNC input is then disconnected by the hardware, the DC calibration signal being connected to the front-end input (automatic activation of RL1). Relay RL3 (_IN/20) selects between a divide-by-20 or a direct path for the signal. Relay RL4 (DC) sets the AC/DC coupling, which is preceded by a divide by 10 amplifier.

- High impedance buffer : A0 is a high impedance buffer with a gain of 10. The same buffer is used for the offset control. Switch SW2 (of/10) selects a direct or a divide by 10 amplifier.



uP control 935x-31
BUFFER ADDRESS SCALER
_BUFCKE
_DAS
_BUFCLD
EN
LD
BUFA[1..17]
ADC ADDRESS SHIFTER
GAL
ROUTE1_A
ROUTE2_A
ROUTE2_B
ROUTE3_C
BA[1..20]
MDA[0..2]
PS[21..23]
DA[0..23]
DA[2..18]
ADC ADDRESS SELECTOR
DA[6..21]
BA0
DA0
MA[5.21]
DA5
MA5
TBA5
(from TB)
BMAOE
IIC SELECTOR
DA[8..10]
8x
SDA
DATA BUFFER
BD[0..15]
DD[0..15]
DD[8..15]
SCL
IIC CONTROLLER
DD[0..7]
WATCHDOG ADC
SERIAL READ
BA[12..15]
SDRA
OVFEOR
8 inputs
SERIAL WRITE
BA[12..16]
STATUS
OVFE (A to D)
PPOFF
IIC
WATCHDOG
CONTROL DAC
DD[0..15]
PROBUS
16
DAC
DACOUT
DA[1..5]
M I M O S A
MCL404
DEMUX
SSH[0..15]
FF

- The MFE409 is a monolithic circuit with the following mean features :

- Differential input with 6 fixed sensitivities (2 mV/div. to 100 mV/div. in a 1-2-5 sequence).
- Continuously variable gain amplifier with gain ratio of almost 3.5.
- A2 is a second variable gain amplifier used to reach the gain needed for the 2 mV/div. setting.
- A3 delivers two complementary outputs, one for the ADC system and one for the trigger circuit (MTR408). A3 can be trimmed for gain and linearity. Typically, A1 will be set with 20 mV/div. and a gain of 3.0, A2 with a gain of 2.0 and A3 will be trimmed to have 320 mV FS into the ADC system input with the lowest non-linearity.
- The bandwidth control, connected through switch SW3 (BWL), is implemented with a one pole RC filter with a -3 dB cut-off frequency of almost 30 MHz.
- Another bandwidth control, connected through switch SW4 (BWLD), is here to correct the shape of the signal when the divide-by-20 attenuation is selected (gain > 100 mV) in 1 MΩ high impedance coupling.
- The output to the ADC system is separated in two 75 Ω lines, going through the relay RL5 (RSH) which selects the source for one of each ADC system couple (B for AB or C for CD), this is to implement the 1 GS/s mode.

4.2.3.2 Digital controls

0141 0z00 - 0141 0zff	write channel A control register
0141 1z00 - 0141 1zff	write channel B control register
0141 2z00 - 0141 2zff	write channel C control register
0141 3z00 - 0141 3zff	write channel D control register

15							8
_VCAL	_IN/20	2mV	5mV	10mV	20mV	50mV	100mV
7							0
---	---	BWL	RSH	BWLD	OF/10	DC	_HZ

range mV	BWLD	OF/10	_IN/20	2mV	5mV	10mV	20mV	50mV	100mV	gain to ADC
2	0	1	1	1	0	0	0	0	0	+20
5	0	1	1	0	1	0	0	0	0	+8
10	0	1	1	0	0	1	0	0	0	+4
20	0	0	1	0	0	0	1	0	0	-2
50	0	0	1	0	0	0	0	1	0	-0.8
100	0	0	1	0	0	0	0	0	1	-0.4
200	_HZ	1	0	0	0	1	0	0	0	+0.2
500	_HZ	0	0	0	0	0	1	0	0	-0.08
1000	_HZ	0	0	0	0	0	0	1	0	-0.04
2000	_HZ	0	0	0	0	0	0	0	1	-0.02

_VCAL	0 = DC calibration (external BNC is disconnected), 1 = input coupling.
IN/20	0 = attenuation is ON, 1 = attenuation is OFF.
BWL	0 = bandwidth limit is OFF, 1 = bandwidth limit is ON.
RSH	0 = channel only on one ADC, 1 = channel on two ADC.
BWLD	0 = high impedance bandwidth compensation is OFF, 1 = ON.
OF/10	0 = offset control attenuation is OFF, 1 = ON.
DC	0 = AC coupling, 1 = DC coupling.
_HZ	0 = 1 MΩ high impedance coupling, 1 = 50 Ω coupling.

0140 4z00 - 0140 4zff read channels overload (and option package availability)

7							0	LSB-1
_INTWD	_INTIIC	_OVL_T	_PPOFF	_OVL_D	_OVL_C	_OVL_B	_OVL_A	OPT

_INTWD	watchdog ADC interrupt,
_INTIIC	I^2C protocol interrupt,
_PPOFF	probe power overload interrupt,
_OVL_n	overload indicator (Ch A, B, C, D, EXT).
OPT	935XA-CKTRIG option package (9^{th} bit of serial read).

A low state indicate that overload or interrupt is detected. Bit OPT is high when the options are available.

0140 5z00 - 0140 5zffread overload sum

OVLSUM	bit 7, Sum of the eight above bits. 0 = OK, 1 = problem occurred (read channels overload)

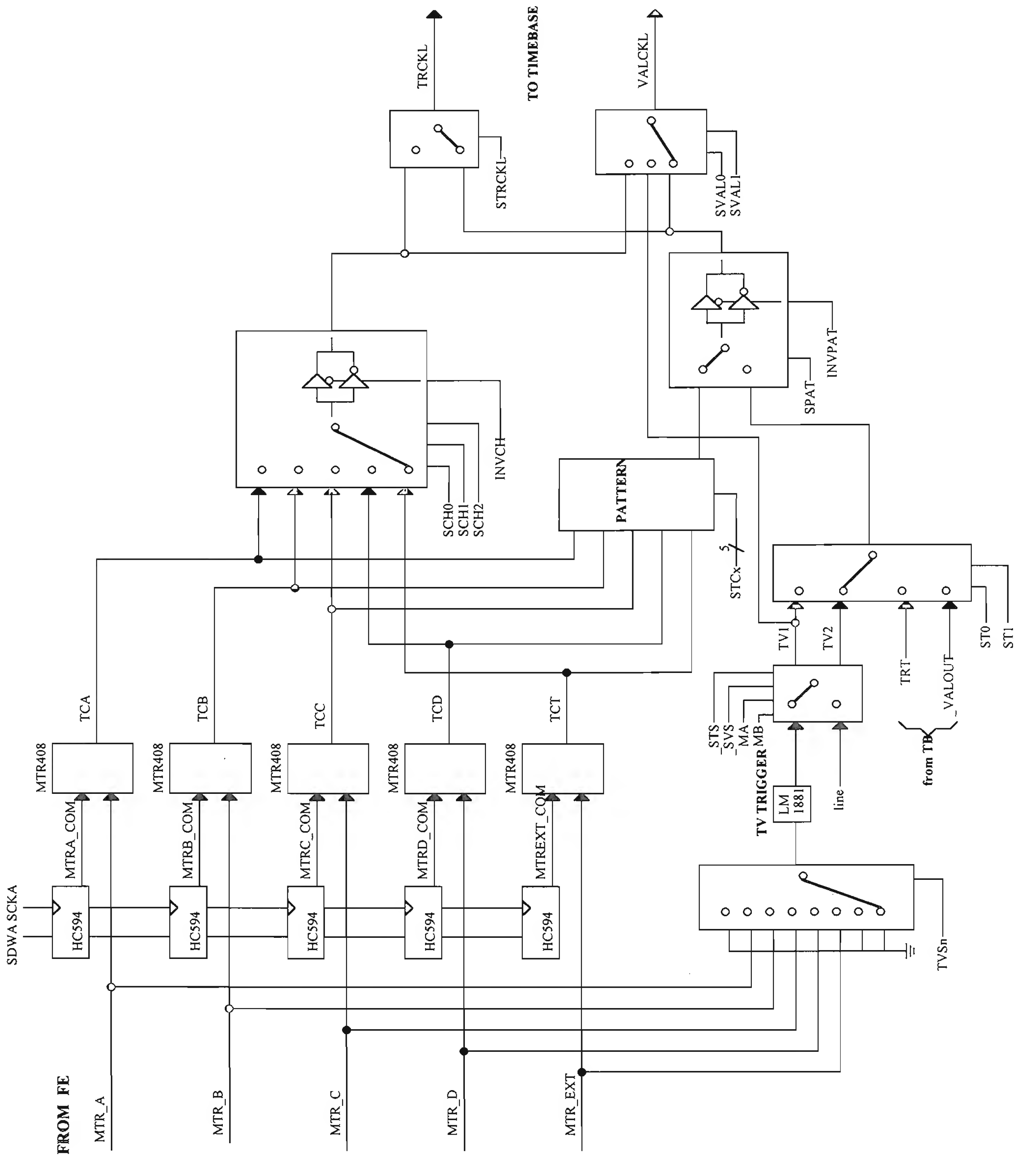
4.2.3.3 Analog controls

- One precision DAC with associate circular memory (µP system) drives and refreshes a multiple sample-and-hold system. The DC calibration control is common to all four channels. Each channel has two analog controls.
- VCAL and VOFFSET are voltage controls. The DAC dynamic range (± 10V) is scaled to the proper range by means of resistor dividers and thus the conversion can be said to be linear. The gain controlled amplifiers inside the MFE409 needs current mode controls. A voltage to current converter follows the sample-and-hold IVGAIN signal and provides the appropriate range. The addresses are :

0300 0014	write DC calibration level control (VCAL)
0300 0000	write channel A gain control
0300 0002	write channel A offset control
0300 0004	write channel B gain control
0300 0006	write channel B offset control
0300 0008	write channel C gain control
0300 000a	write channel C offset control
0300 000c	write channel D gain control
0300 000e	write channel D offset control

4.2.4 Trigger

4.2.4.1 Block Diagram



The different trigger couplings are :

- DC
- AC : cut off frequency is almost 10 Hz.
- LF REJ : set a single pole high pass filter with a cut off frequency at 50 kHz.
- HF REJ : set a single pole low pass filter with a cut off frequency at 50 kHz.
- TBWL : single pole low pass filter at 30 MHz.

The amplitude at the input of the MTR408 is 320 mV FS (identical to the ADC system),

4.2.4.2 Digital Controls

The 40 bit shift register, is allocated as follows :

0141 4z00 - 0141 4zffwrite trigger control register

39							32
---	TBWL_A	HFR_A	AC_A	DC_A	---	SNEG_A	SPOS_A
31							24
TEXT50	TBWL_B	HFR_B	AC_B	DC_B	---	SNEG_B	SPOS_B
23							16
---	TBWL_C	HFR_C	AC_C	DC_C	---	SNEG_C	SPOS_C
15							8
---	TBWL_D	HFR_D	AC_D	DC_D	---	SNEG_D	SPOS_D
7							0
_EXT/10	TBWL_EXT	HFR_EXT	AC_EXT	DC_EXT	---	SNEG_EXT	SPOS_EXT

TEXT50 0 = 1 MΩ external input coupling, 1 = 50 Ω external input coupling.
_EXT/10 0 = attenuation is ON, 1 = OFF.

4.2.4.3 Analog Controls

A sample and hold fed by the precision DAC provides the threshold level.

The addresses are :

0300 0010 write EXT threshold control
0300 0018 write channel A threshold control
0300 001a write channel B threshold control
0300 001c write channel C threshold control
0300 001e write channel D threshold control

4.2.4.4 TV Trigger

Each channel has a pick-off after the MFE409 or after the high impedance buffer for external trigger. The TV trigger source is selected via bit TVS and drives a times 10 amplifier with complementary outputs. These outputs are selected (_TVINV) depending on the state of the selected MFE409 gain.
The TV trigger uses a commercial chip (LM1881) and provides two outputs,TV1 & TV2. This circuit is able to trigger on different TV line number standards.

▪ Digital Controls

The 16 bit shift register, written using the serial protocol, is allocated as follows :

0141 5z00 - 0141 5zffwrite trigger TV and MST412 oscillator control register

15							8
_TVINV	TVS2	TVS1	TVS0	HDTV	875	MB	MA
7							0
_STI	_STW	_SVS	_STS	---	---	---	---

_TVINV 0 = inverting TV trigger (to compensate for inversion in MFE409).
_SVS 0 = enable TV1 source.
_STS 0 = enable TV2 source.
_STI 0 = enable interval width mode for MST412 oscillator control.
_STW 0 = enable pulse width mode for MST412 oscillator control.

TVS2	TVS1	TVS0	TV trigger source	HDTV	875	line setting
0	0	1	channel A	0	0	525-625 TVLO
0	1	0	channel B	0	1	875 (MED)
0	1	1	channel C	1	0	1225 (HIGH)
1	0	0	channel D	1	1	2500 (HDTV)
1	0	1	external trigger			

4.2.5 Analog to Digital Converter

4.2.5.1 Introduction

The analog to digital converter system does the signal conversion to 8 bits.

- Sample and Hold : the HSH416 Hybrid with Analog bandwidth of 1GHz, performs the track and hold before the ADC. It is clocked at three different frequencies : 500 MHz, 400 MHz, and 200 MHz. The offset is calibrated by use of a current mirror controlled by a 8 bit DAC.

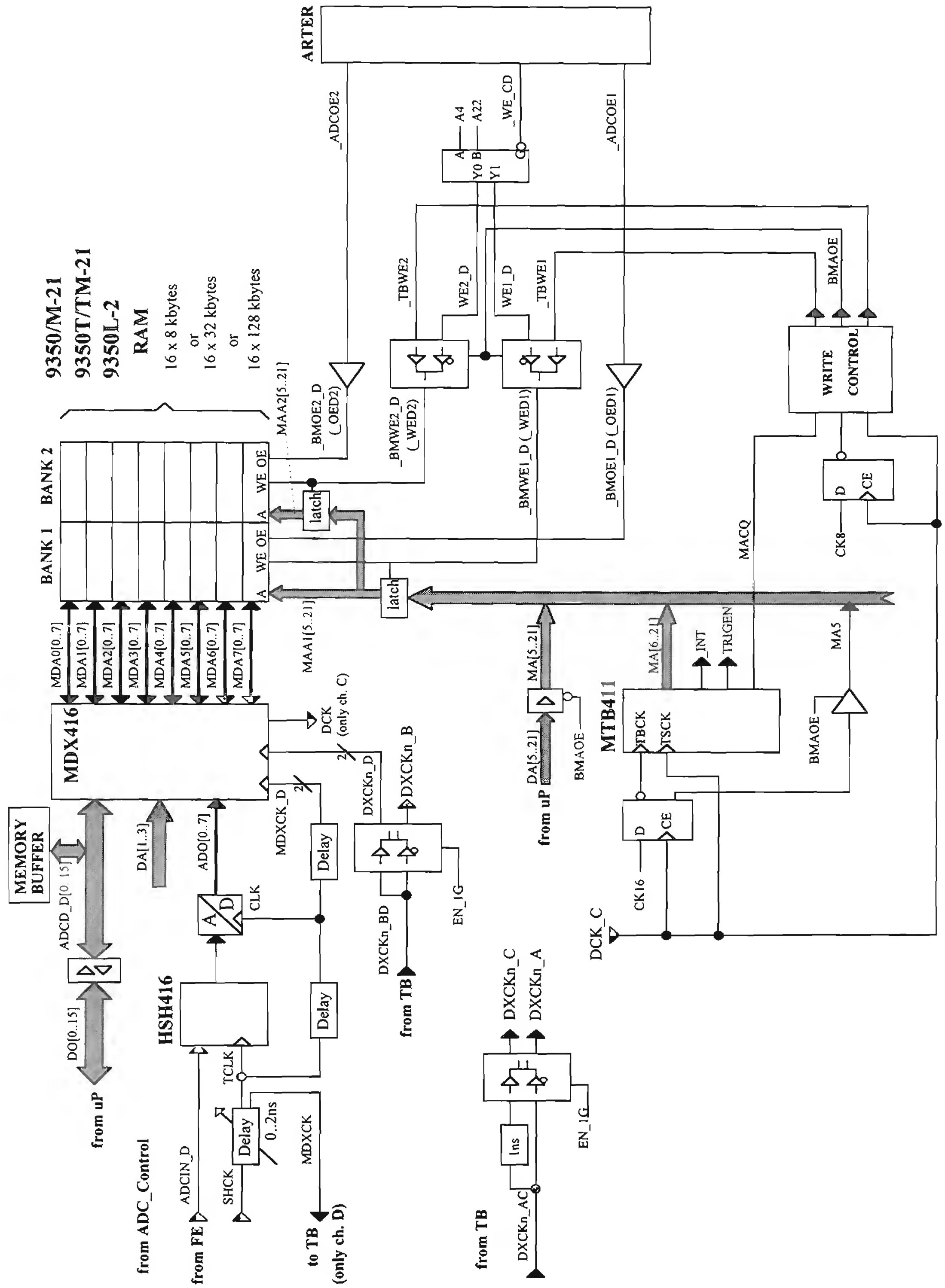
- Flash ADC : the TDA8718 is a folding ADC working at a maximum clock speed of 500 Ms/s. The gain is calibrated by adjusting the internal resistor ladder using a 8 bit DAC. The ADC input level is 240 mV peak to peak on 75 Ω, from the nominal 320 mV front-end output.

- Demultiplexer : the MDX416 monolithic is used to demultiplex the ADC output, and catch the glitch (min/max).

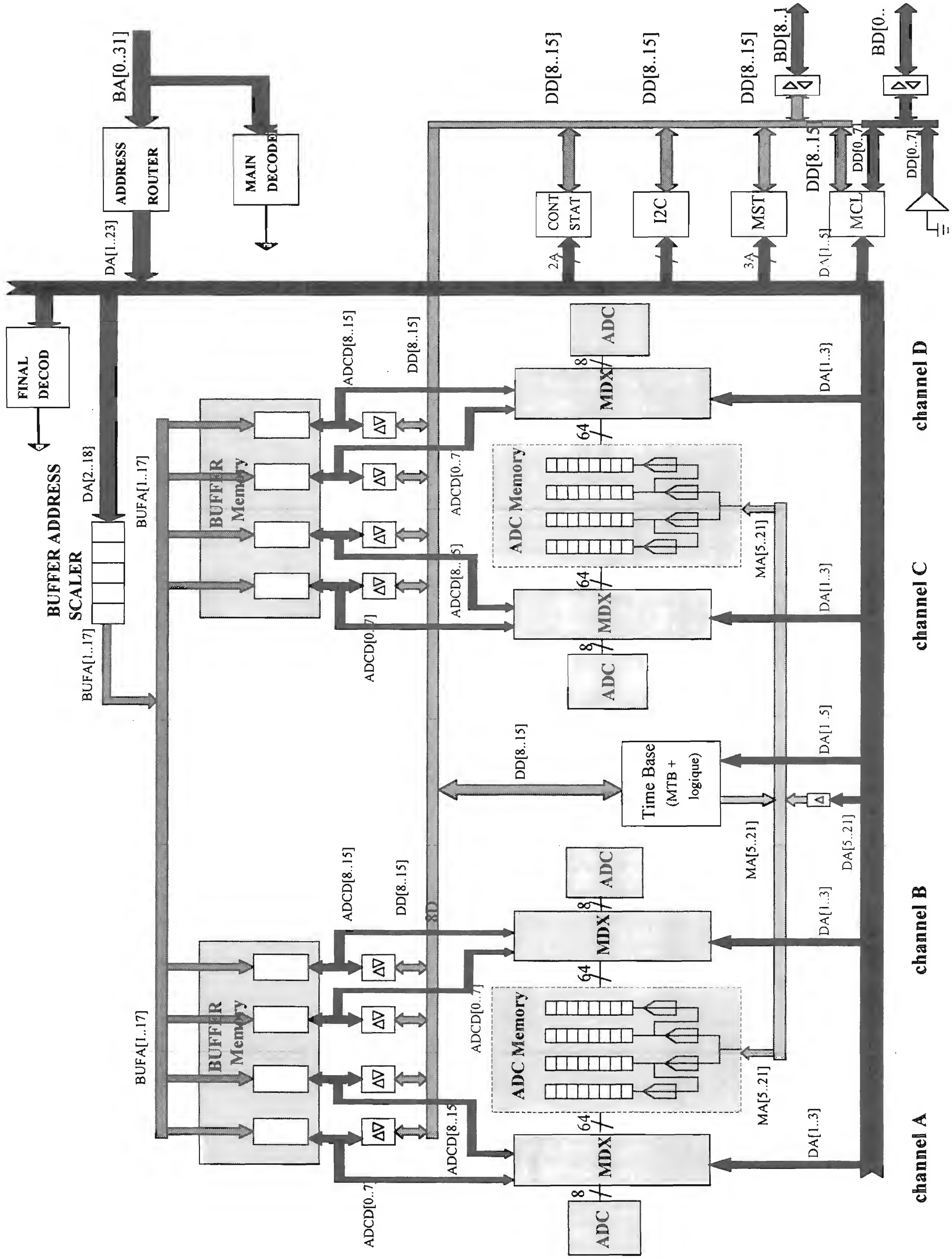
- Buffer Memory : 128K bytes

- ADC Memory : 50K points for 9354A, 100 K for 9354T, 250K for 9354AM, 500 K for 9354TM, 2M points for 9354AL. Memory length may be extended by combining the acquisition memories of multiple channels.

4.2.5.2 ADC Block Diagram



4.2.5.3 Memories Block Diagram



4.2.6 Time Base

4.2.6.1 Introduction

The main clock (SHCK) comes from a PLL oscillator with a 10 MHz reference, there is a control bit (SEXTREF) to select an optional external reference with ECL level.

The PLL output frequency is controlled by three bits (SF500, SF400 and _SF200). The main clock is directly used by the sample-and-hold, the analog-to-digital converter and the time-to-digital converter for real time measurement. It is also used for synchronization inside the MDX416 demultiplexer.

The main clock is then feedback to the time base, from the ADC system (MDXCK), to drive a pre-divider controlled by four bits (DIVn). The output of the pre-divider then drives the MTB411 frequency divider (FD). At fastest speed, when the MTB411 frequency divider is not used, the clock to FD (FDCK) can be disabled (DISFD).

The main clock can also be driven from the external trigger BNC, this path is selected by a control bit (SEXTCK). The external clock threshold can be modified by two bits from the time base mode control (EXTCTH1 and EXTCTH2). This external clock frequency range is 0 to 100 MHz.

The PLL oscillator has in fact only two values, 500 and 400 MHz, the 200 MHz is a secondary path coming from a divider by two.

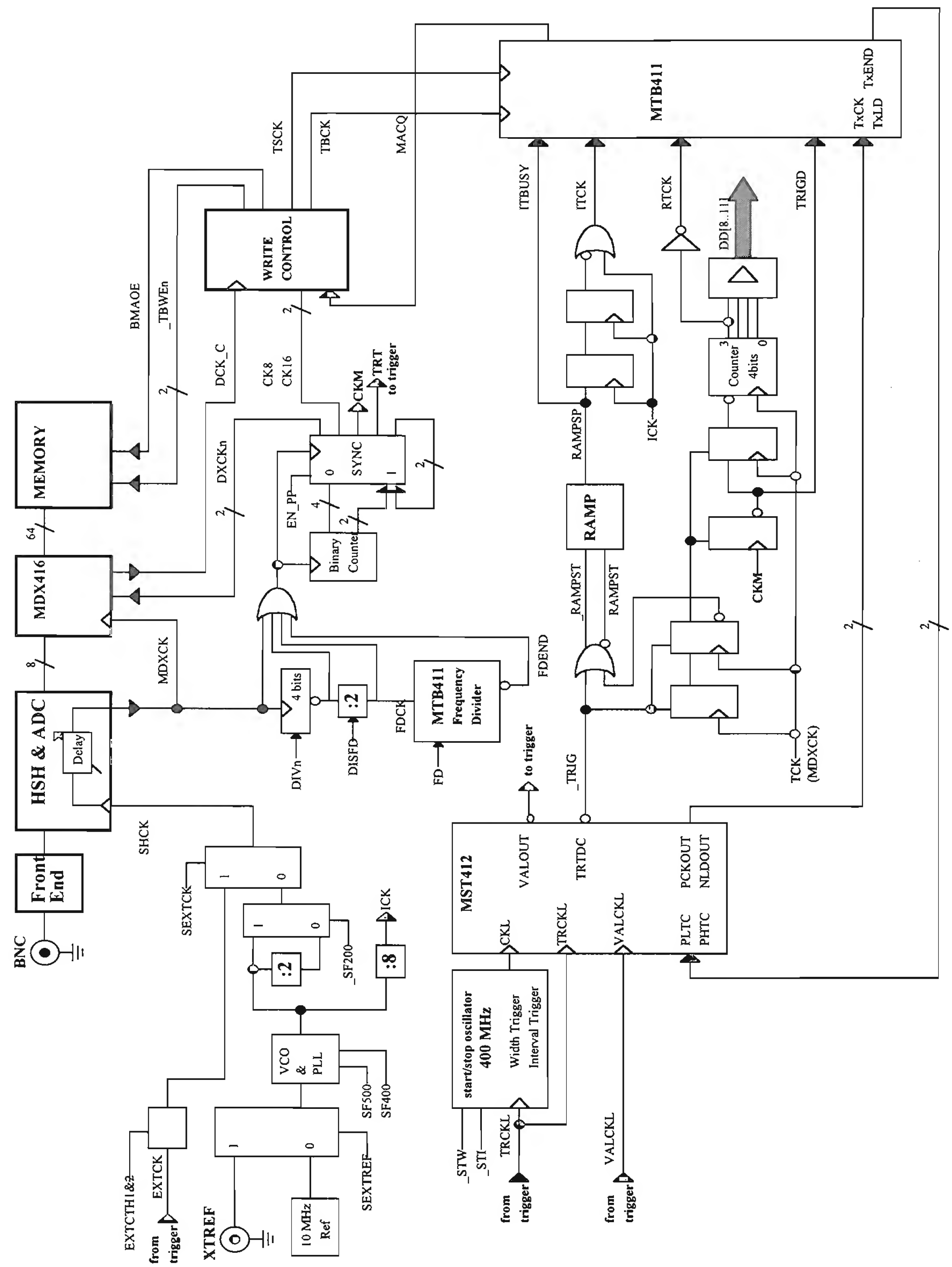
- 500 MHz is used for fast timebase settings, 1 GS/s, 2 GS/s and RIS mode.
- 400 MHz is used as soon as possible when starting to skip samples (skip > 1) in order to be able to do a peak detection (min-max) with the MDX416.
- 200 MHz is used for Roll mode.

There is also another reference clock for the interpolated TDC (ICK) which comes from a divider by eight. Its frequency is then 62.5 or 50 MHz, to be able to directly use the MTB411 counter (general time base control, start/stop, counters, memory address).

The output of the fast frequency divider is combined with the output of the MTB411's FD to drive a synchronous clock generator. The main functions are :

- reference to the MDX416 (DXCKn) and to the memory address generator (CK8 and CK16),
- synchronize the trigger (CKM for TRIGD),
- calibrate the MST412 use for smart trigger (TRT).

4.2.6.2 Time Base Block Diagram



4.2.6.3 Digital Control

0141 8z00 - 0141 8zffwrite Time Base divider register

15							8
---	---	---	---	---	SECK500	EN_1G	SEXTREF
7							0
DISFD	_SF200	SF500	SF400	DIV3	DIV2	DIV1	DIV0

where :

- SECK500 select optional external clock (100 MHz to 500 MHz).
- EN_1G enable 1 GS/s/s acquisition (1 ns delay on MDX416 clock).
- SEXTREF select optional external PLL clock reference (10 MHz ± 5 %).
- DISFD disable FD clock to MTB411.
- _SF200 select oscillator frequency 200 MHz.
- SF500 select oscillator frequency 500 MHz.
- SF400 select oscillator frequency 400 MHz.
- DIVn frequency pre-divider (4 bits).

4.2.6.4 Trigger Selection

Each differential outputs of the five MTR408 from the Front-End (TCx) are selected (bit SCHn) and then inverted (bit INVCH) to drive the TRCKL signal and the VALCKL signal (bit SVAL1).

A logical function of the TCx signals can be selected (bit STCx) for the pattern generator. A few single ended signals can also be selected one at a time (bit STn). These signals are TV1 and TV2 for television trigger, TRT for test and calibration of MST412, _VALOUT for drop-out trigger.

Then there is a selection between the pattern and the single ended sources (bit SPAT). The signal obtained is inverted (bit INVPAT) and used to drive TRCKL (bit STRCKL). There is also a choice between this signal and TV1 to drive VALCKL (bit SVAL0). The pattern trigger logic function is any "AND" combination of TCx input signals, inverted or not. All the control are done through a 16 bit serial register.

4.2.6.5 Smart Trigger

The VALCKL source drives the MST412. The TRCKL source goes through a buffer to drive the MST412 and control the smart trigger 400 MHz start/stop oscillator.

The MST412 oscillator is usually free running, but when using glitch trigger mode the oscillator is enable only during the pulse duration (bit _STW), and when using interval width trigger mode the oscillator is restarted at each edge (bit _STI).
There is also a time base mode control register with roll mode interrupt enable (RMIE), external clock control (SEXTCK, EXTCTH1 and EXTCTH2), buzzer (BUZZ) and calibration front panel output signal selection (PCSn).

4.3 F9300-4 GPIB and RS 232 Interface

This board is connected to the processor through a flat cable.
Data bus is 8 bits, address bus: 12 bits.
Address 0180 000 to 0180 00FF.

4.3.1 RS 232 Serial Interface

Based on the 2661A IC from Signetics or Philips.

- Clock frequency 4.9152 MHz.
- 4 internal registers of 8 bits.
- Interrupt level 2.
- Connector type DB9 with 9 male pins.

4.3.2 GPIB Interface

Based on the circuit 7210 IC from NEC.

- Clock frequency 5 MHz.
- 8 internal registers of 8 bits.
- Tri-state external GPIB drivers. - Low level output.
- Interrupt level 3.

The GPIB address is set by software and stored in non-volatile memory.

4.4 F9354-5 Front Panel

The front panel is connected to the processor board with a flat cable. Power supply and control signals are supplied from the processor. The front panel is divided in two sections:

- One board with Motorola 68HC05C4 processor, coders, and serial data interface.
- One matrix Keyboard with push buttons.

4.5 F9300-6 Centronics, Floppy, Printer interface option

4.5.1 Centronics interface option

This Centronics interface makes direct connection possible to external parallel printer.

- Address 0130 0180 to 0130 01A0
- Interrupt level 2

4.5.2 Floppy Disk drive interface option

Based on the circuit MCS3201 from Motorola.

- Address 0130 01C0 to 0130 01C7
- Interrupt level 4

Address	Read	Write
0130 01C0	Input register	-----
0130 01C2	-----	Digital output register
0130 01C4	Main status register	-----
0130 01C5	Data register	Data register
0130 01C7	Data input register	Disk control register

4.5.3 Printer Interface option

Internal graphic printer : Seiko LPT5446

- Address 0130 0140 to 0130 0160
- Interrupt level 2

4.6 F9300-7 Printer Controller option

Based on the LPT5000 series control chip set from Seiko instrument Inc

- PT501P01 CPU
- PT500GA1 Gate array
- Technical reference 39019-2234-01
- Address 0130 0100

4.7 F9300-8 Hard Disk option, PCMCIA III Controller

- Address 0130 0800 to 0130 0bff
- Interrupt level 5

4.8 93XX-Display

4.8.1 General Description

The raster scan display module is divided into five sections:

- Graphic processor
- Deflection
- Video
- Yoke
- Cathode ray tube

4.8.2 Basic Characteristics

- Nine inches diagonal monochrome, yellowish, orange.
- CRT anti-glare treated
- Non interlaced resolution of (X)810 x (Y)696 pixels at 60 Hz or 50 Hz frequency.

- Landscape vertical raster
- Electromagnetic deflection.
- Intensity control rise and fall time > 12 ns.
- Analog intensity input
- TTL synchronization input.
- Horizontal nominal size: 165 mm for X-on = 15.39 Ms.
- Horizontal size adjustment: > +/- 5 mm.
- Horizontal offset adjustment: +/- 5 mm.
- Vertical nominal size: 120 mm for Y-on = 14.5µs.
- Vertical size adjustment: > +/- 5 mm.
- Vertical offset adjustment: +/- 5 mm.
- X and Y differential non linearity: 10%.

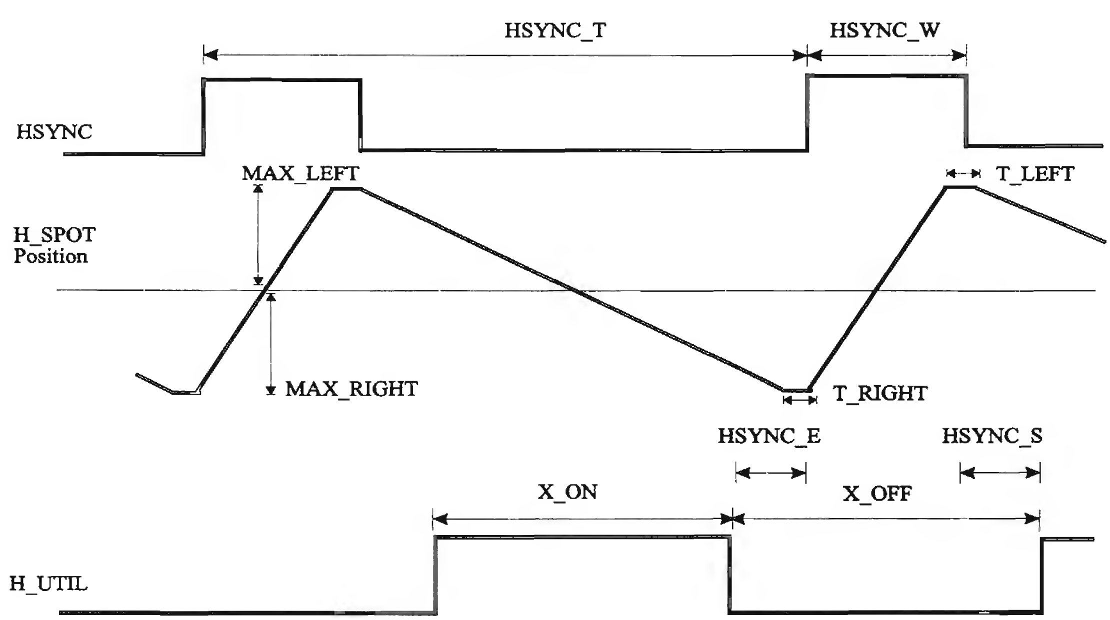
The line deflection is vertical, from bottom to top. The field deflection is horizontai, from left to right and is resynchronized to the power line frequency.

4.8.3 Horizontal Deflection

The horizontal deflection is synchronized to the 50 or 60 Hertz power line frequency. The on time display is the same for both frequencies, therefore the deflection is calculated for 60 Hz. The horizontal deflection is controlled by the HSYNC signal.

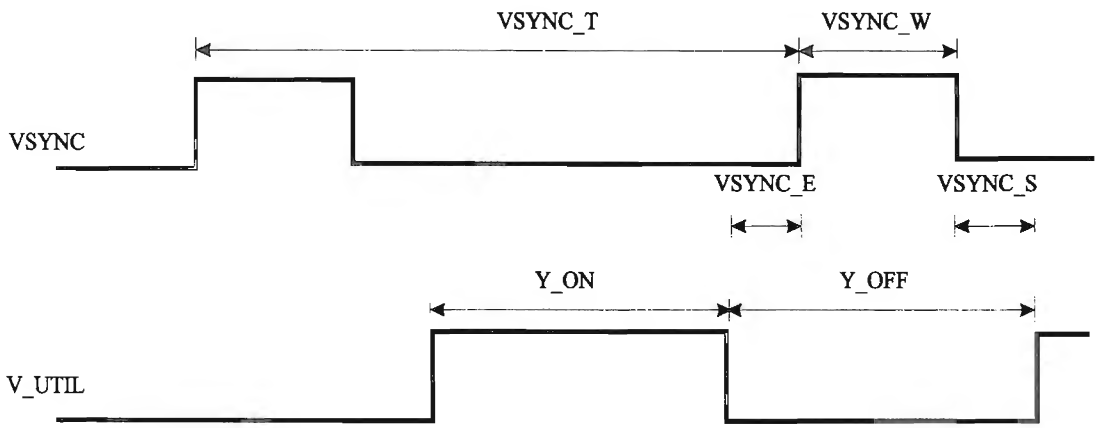
The trailing edge of HSYNC resets the horizontal spot position to a hardware predefined position at the left side of the screen: MAX_left. When ever HSYNC is high, the spot stays at this position.

The falling edge of HSYNC starts the horizontal deflection ramp. The ramp has the same rate for either 50 or 60 Hertz frequency.
When ever HSYNC is low, the horizontal deflection will rise left to right, until HSYNC becomes high, or the system has reached the maximum right position (MAX_RIGHT).



4.8.4 Vertical Synchronization

The timing of both VSYNC and HSYNC is synchronized to the pixel clock (PCLK).



The pixel rate is 48 MHz.

4.8.5 Horizontal Resolution

	# of vertical line	Time in ms
HSYNC_T	842	15.998
HSYNC_W	22	0.418
HSYNC_E	4	0.076
HSYNC_S	6	0.114
X-ON	810	15.390
X-OFF	32	0.608

Values of the horizontal timing for the maximum field refresh frequency.

4.8.6 Vertical Resolution

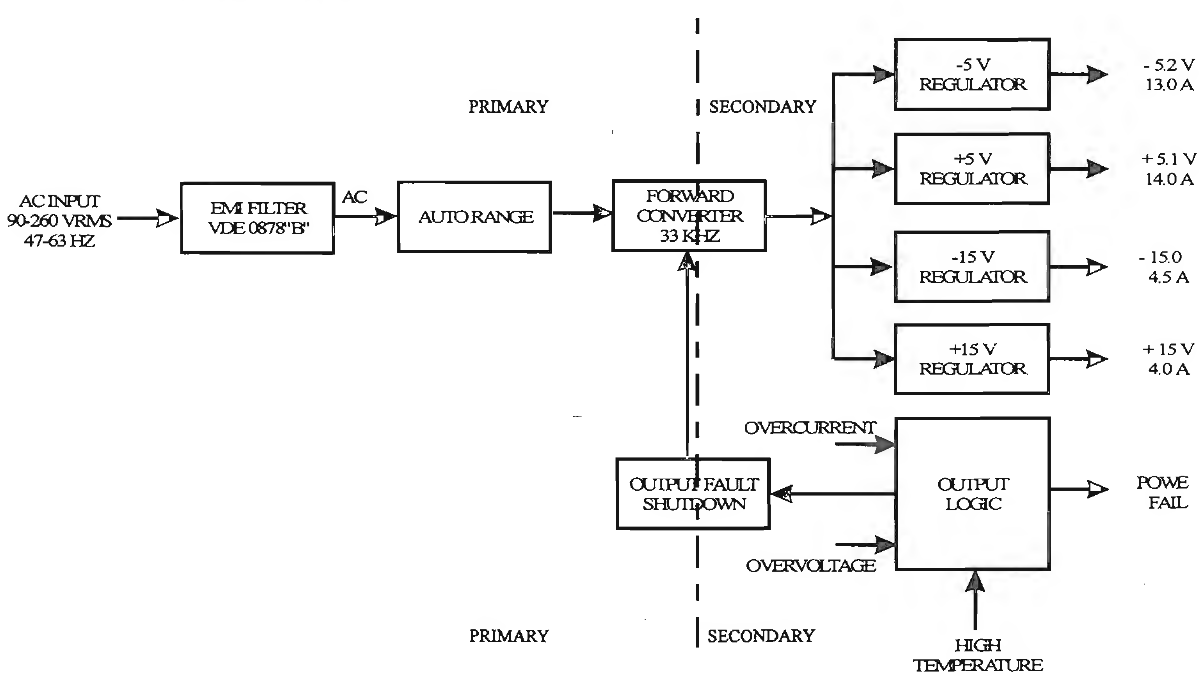
	# of Pixels	Time in µs
VSYNC_T	912	19.000
VSYNC_W	136	2.833
VSYINC_E	0	0.000
VSYNC_S	80	1.666
Y-ON	696	14.500
Y-OFF	216	4.500

4.9 PS9351 Power Supply

4.9.1 Power Supply Specifications

Input voltage	: 90 to 130 V or 180 to 260 V. Auto ranging line voltage.
Input frequency	: 47 Hz to 63 Hz.
Input rush current	: Max. 40 A peak at start up.
Environmental	: Operating temperature range 0 °C to + 50 °C Storage temperature range - 55 °C to + 80 °C Relative humidity from 5% to 95%.
Output voltages	: - 5.2 VDC, 13 amp Max. + 5.2 VDC, 14 amp Max. - 15.1 VDC, 4.5 amp Max + 15.1 VDC, 4 amp Max.
Output adjustment	: +/- 5%.
Regulation	: +/- 1%.
Transient response	: recover to 1% of its final value within 500 µsec.
Ripple and noise	: Peak to peak value < 50 mV
Hold up time	: 16 msec at full load
Output short circuit protection	: Yes.
Output over voltage protection	: Yes.
Input protection	: 6 amp fuses.
Thermal protection	: Yes.
Safety :	VDE 0806, IEC 380, 435, 950 & UL1012, 478, CSAC22.2#1402C
EMI :	VDE 0871 class A, FCC 20780 class A.

4.9.2 Power Supply Block Diagram



SECTION 5 Performance Verification

5.1 Introduction

This procedure can be used to verify the main operating specifications of the LeCroy 9354A/T digital storage oscilloscope, it is useful as an incoming inspection checkout. It is time consuming and requires extensive test equipment. If you are not familiar with operating the 9354A/T oscilloscope, read the operator's manual.

5.2 Test Equipment Required

Instrument	Specifications	Recommended	Where used
Signal Generator (sine wave)	Frequency : .5 MHz to 1 GHz Frequency Accuracy : 1 ppm Amplitude : 1 V peak to peak	Marconi 2030 or equivalent	5.9.1.a 5.11 5.12
Leveled Sine wave generator	Frequency : .5 MHz -250 MHz Amplitude : 5 V peak to peak	Tektronix SG503 or equivalent	5.9.1.b
Fast pulse Generator	Rise time < 500 psec	LeCroy 4969 or equivalent	5.13
Sine Wave Generator	Frequency : 5 KHz Amplitude : 6 V peak to peak	LeCroy LW420 or equivalent	5.10
DC precision Power Supply	Amplitude : 10 V, DC Accuracy : < 0.1 %	Tektronix PS5004	5.7, 5.8 5.15
Digital Multimeter	4 digits	Keithley 199 or equivalent	5.4 5.5
Cable	BNC, 50 Ω, length 20 cm, 1ns (7.87 inches)	LeCroy 4802432001	5.10.3 5.10.4
Cable	BNC, 50 Ω, length 100 cm, 5 ns (39.37 inches)	LeCroy 480020101	5.XX
Attenuator	50 Ω, 20 dB 1% accuracy	Suhner	5.7
Attenuator	1 MΩ, 20 dB 1% accuracy	Suhner	5.7
Attenuator	50 Ω, 3 dB 1% accuracy	Suhner	5.10
Terminator	50 Ω Feed through	Suhner	5.13
BNC T adapter	BNC, 50 Ω, T adapter	LeCroy 402222002	5.10.3 5.10.4

Table 5-1 : Test Equipment

5.3 Turn On

- Switch on the power using the power switch on the rear panel and verify :
- The display turns on after about 10 seconds and is stable
- The range of intensity and grid intensity is reasonable

- Wait for about 10 minutes for the scope to reach a stable operating temperature.

5.4 Input Impedance

Specifications

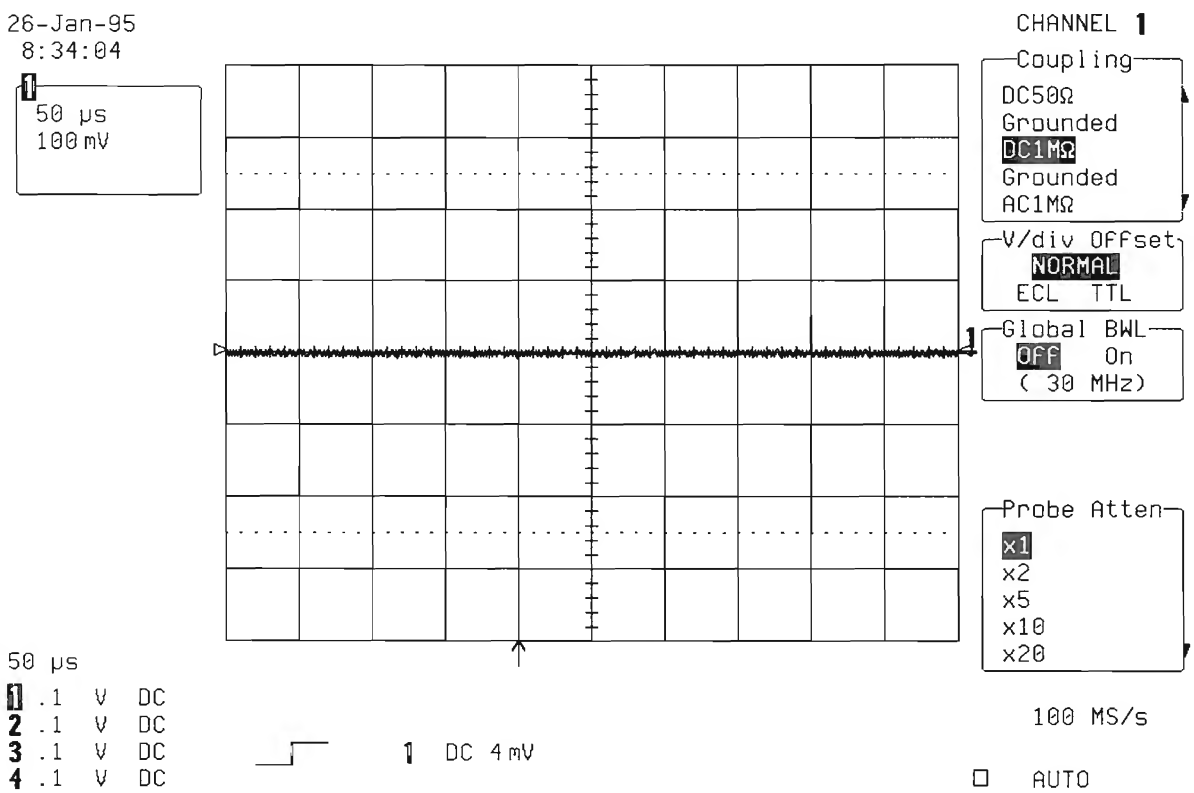
DC 1MΩ ± 1%
DC 50 Ω ± 1%

5.4.1 Procedure

The input impedance is tested in working conditions, with a high precision digital multimeter.

5.4.1.a DC 1MΩ

- Set DSO Channel 1 : **On**
- Input Coupling : **DC 1MΩ**
- Input gain : **100 mV/div.**
- Trigger on : **Channel 1**
- Trigger mode : **Auto**
- Time base : **50 µsec/div.**

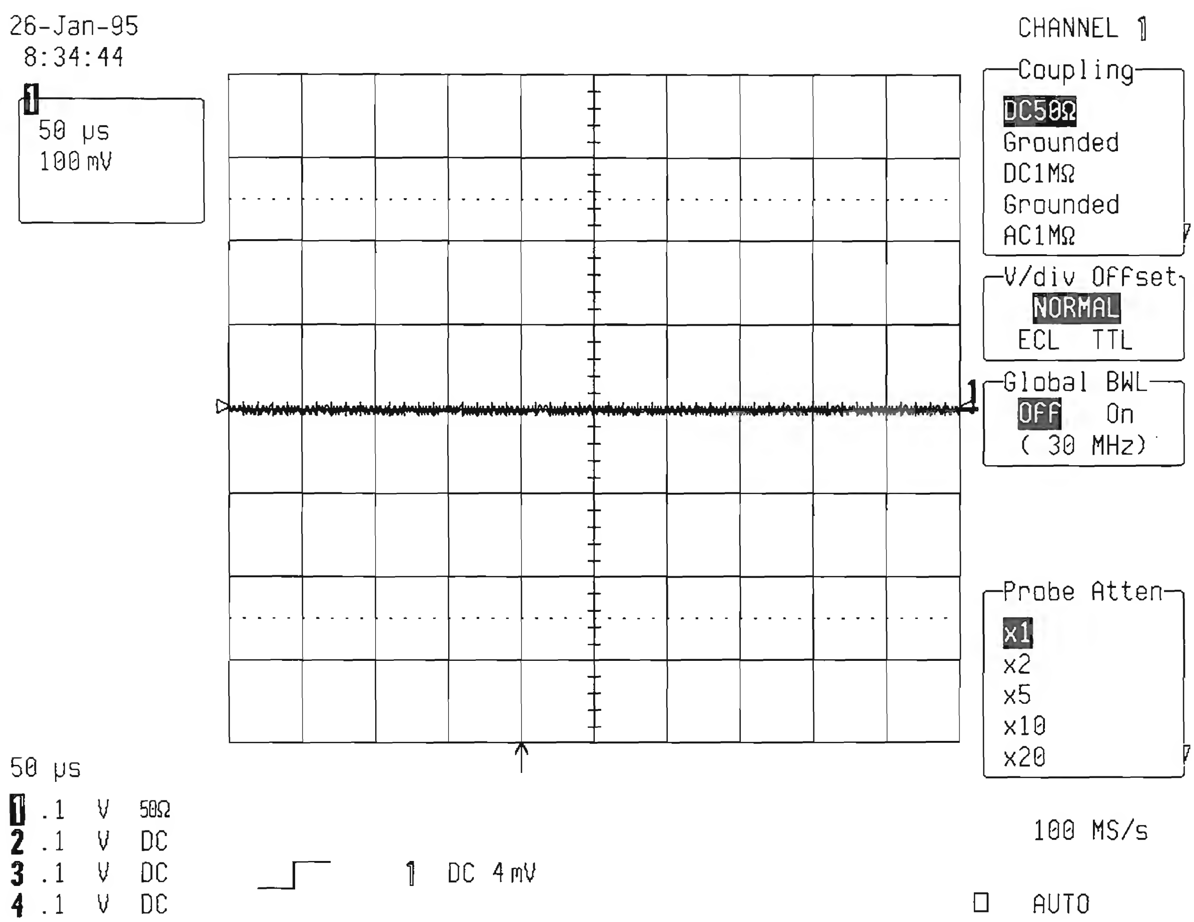


- Measure the impedance using a high precision DMM with sense : must be **1MΩ ±1%**.

- Repeat the above test for input volt/div. of **200 mV**.

5.4.1.b DC 50Ω

- Set DSO Channel 1 : **On**
- Input Coupling : **DC 50Ω**
- Input gain : **100 mV/div.**
- Trigger on : **Channel 1**
- Trigger mode : **Auto**
- Time base : **50 µsec/div.**



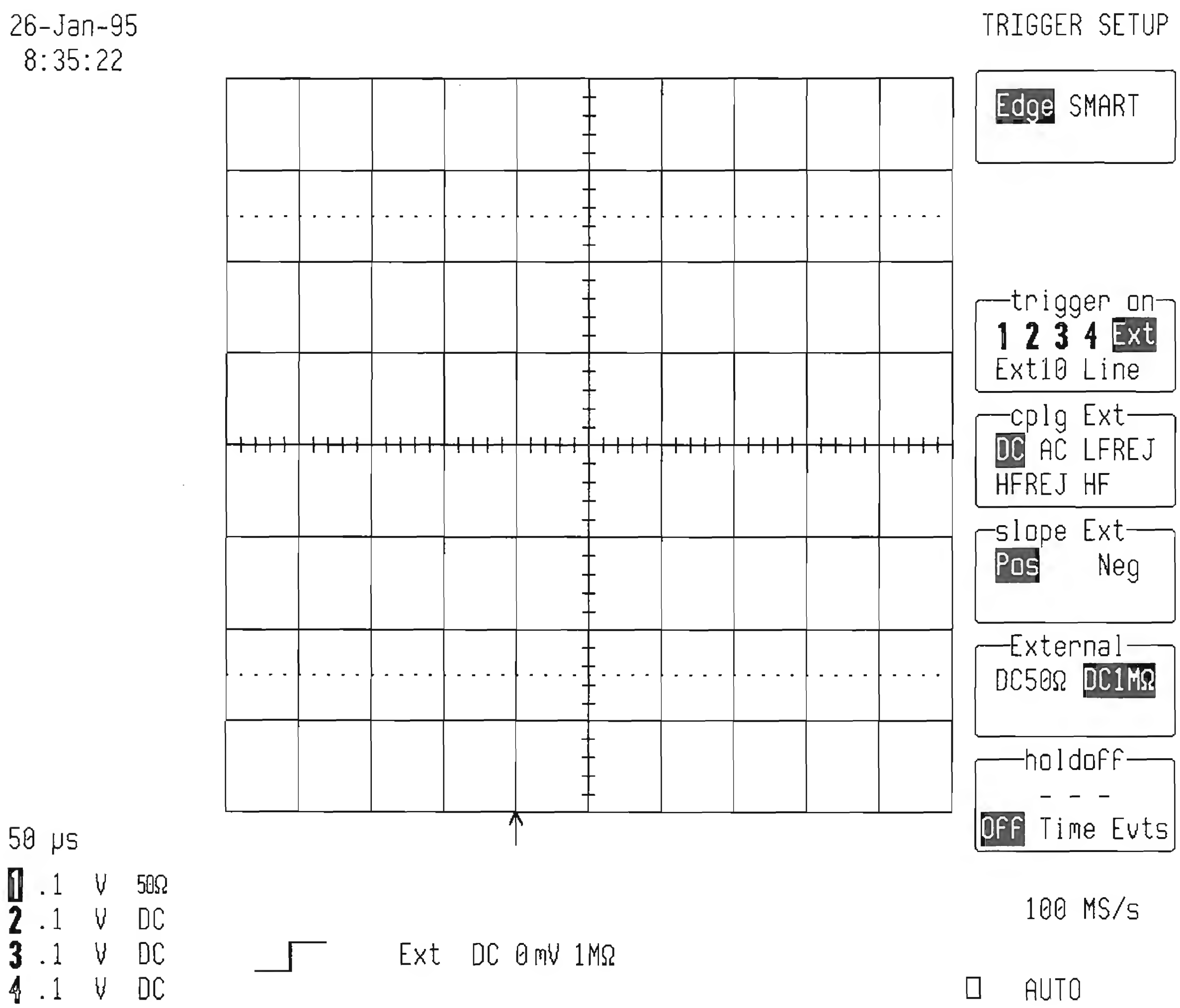
- Measure the impedance using a high precision DMM with sense : must be **50 Ω ± 1%**
- Repeat steps 5.4.1.a, and 5.4.1.b for Channel 2, Channel 3 and Channel 4.

5.4.2 External Trigger Input Impedance

5.4.2.a DC 1MΩ

The External Trigger input impedance is tested with any time base and gain.

- Set Trigger on : **EXT**
- Trigger mode : **Auto**
- Coupling Ext : **DC**
- External : **DC 1MΩ**

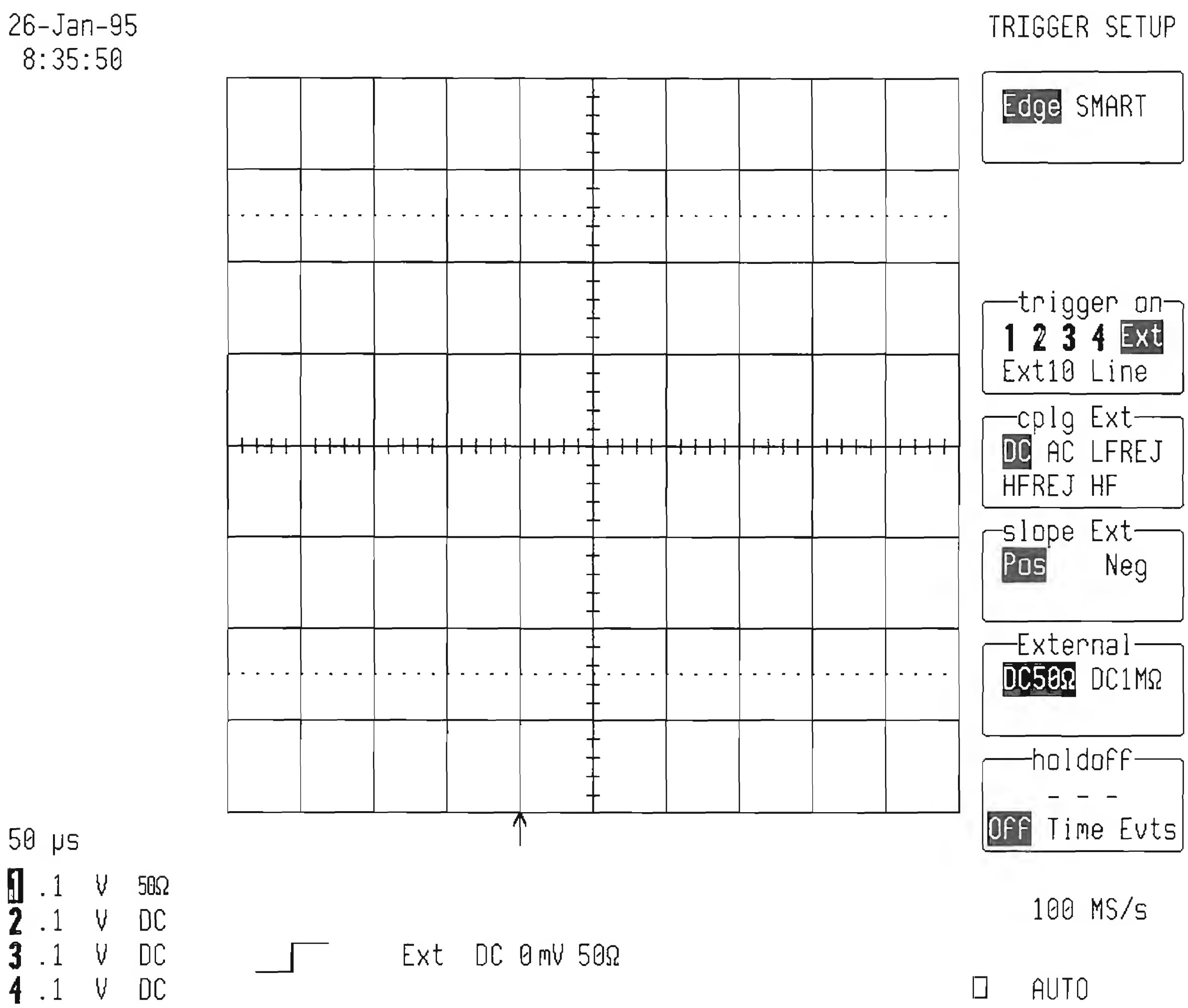


- Measure the impedance using a high precision DMM with sense : must be **1MΩ ±1%**.

5.4.2.b DC 50Ω

With any time base and gain.

- Set Trigger on : **EXT**
- Trigger mode : **Auto**
- Coupling Ext : **DC**
- External : **DC 50Ω**

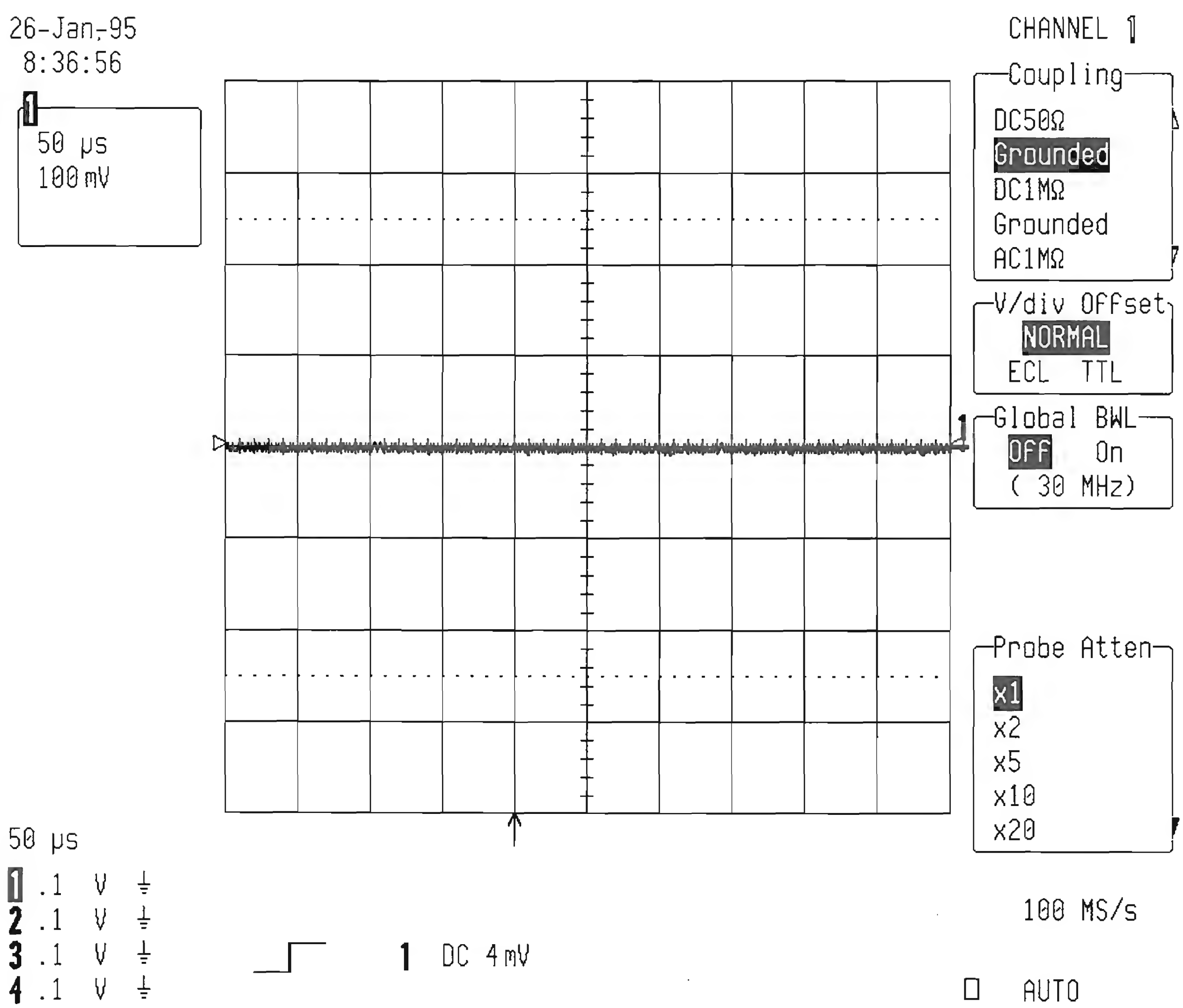


- Measure the impedance using a high precision DMM with sense : must be **50 Ω ± 1%**.
- Repeat steps 5.4.2.a, 5.4.2.b for **Ext/10**, and check as above.

5.4.3 Internal Protective Resistor Verification

With any time base and gain, set DSO as follows :

- Input Coupling : **Grounded**
- Check with a high precision DMM : input impedance must be **1 MΩ ± 2%**.
- In case of problem check SM 1MΩ resistor R1003 or troubleshoot relay RL1000 .
- Repeat the above test for Channel 2, Channel 3, Channel 4.
- In case of problem check SM 1MΩ resistors R2003, R3003, R4003 or troubleshoot relays RL2000, RL3000, RL4000.



5.5 Leakage Current

Specifications

DC 1 MΩ, AC 1 MΩ, DC 50 Ω : ± 1 mV

5.5.1 Procedure

▪ Set DSO Ch1	:	**On**
▪ Input Coupling	:	**DC 50Ω**
▪ Input gain	:	**100 mV/div.**
▪ Trigger on	:	**Channel 1**
▪ Trigger mode	:	**Auto**
▪ Time base	:	**10μsec**

- Connect a high precision DMM to Channel 1, and verify that the reading is not larger than ± **1 mV**.

- Repeat the procedure for **1MΩ DC** and **1MΩ AC**.

- Repeat step 5.5.1 for Channel 2, Channel 3, Channel 4 and check as above.

5.6 Average Noise Level

Description

The 9354A/T inputs average noise level is tested at 5 mV/div., with 0 mV offset.
This is to verify the proper operation of the main board, front-end and ADC's.
The scope parameters functions are used to measure the RMS and Peak amplitude of the noise.

5.6.1 Peak to Peak Noise

Specifications

< ± 3.6 mV Peak to Peak at 5 mV/div.

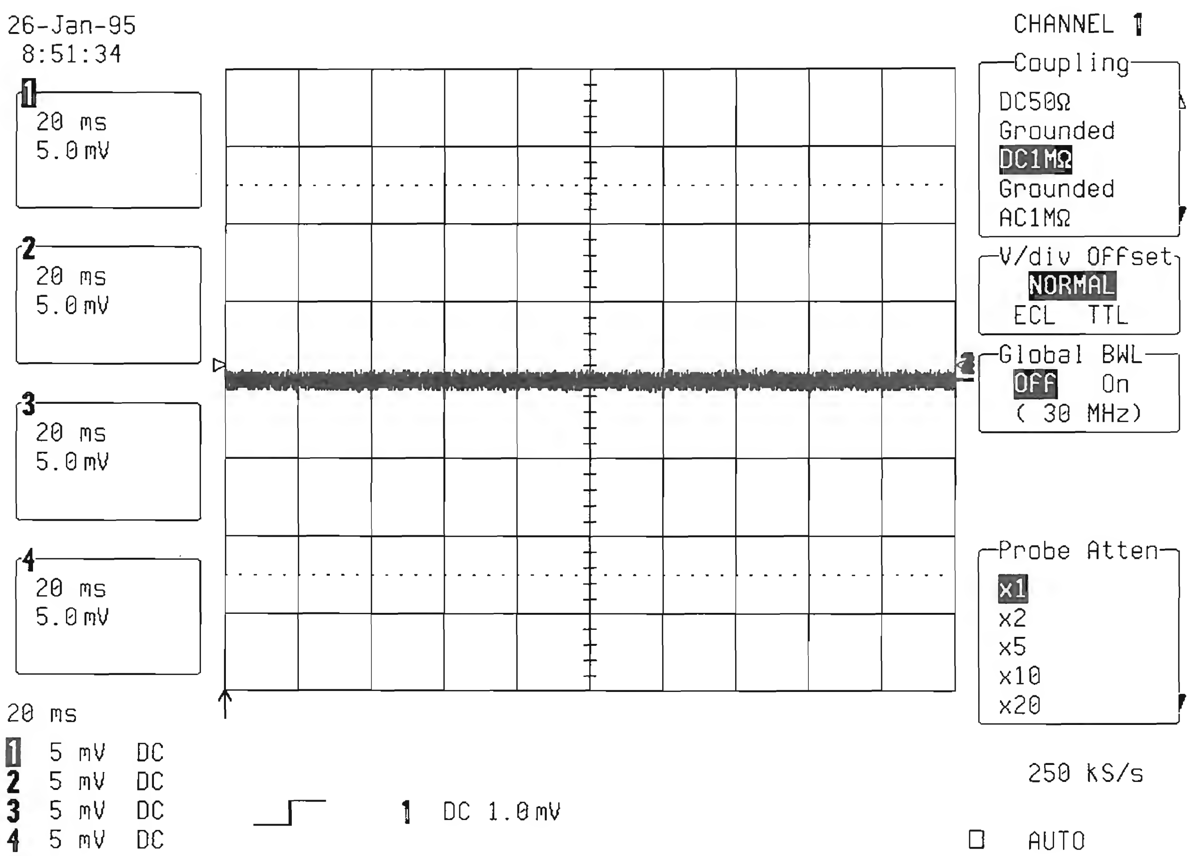
5.6.1.a DC 1MΩ

Procedure

- With no signal connected to the inputs, set 9354A/T DSO settings as follows :

▪ Turn on traces	:	**Ch1, Ch2, Ch3, Ch4**
▪ Display setup	:	**Standard, Dot Join on, Persistence off, Single grid**
▪ Input Coupling	:	**DC 1MΩ**
▪ V/div. offset	:	**Normal**
▪ Probe atten	:	**X1**
▪ Global BWL	:	**Off**

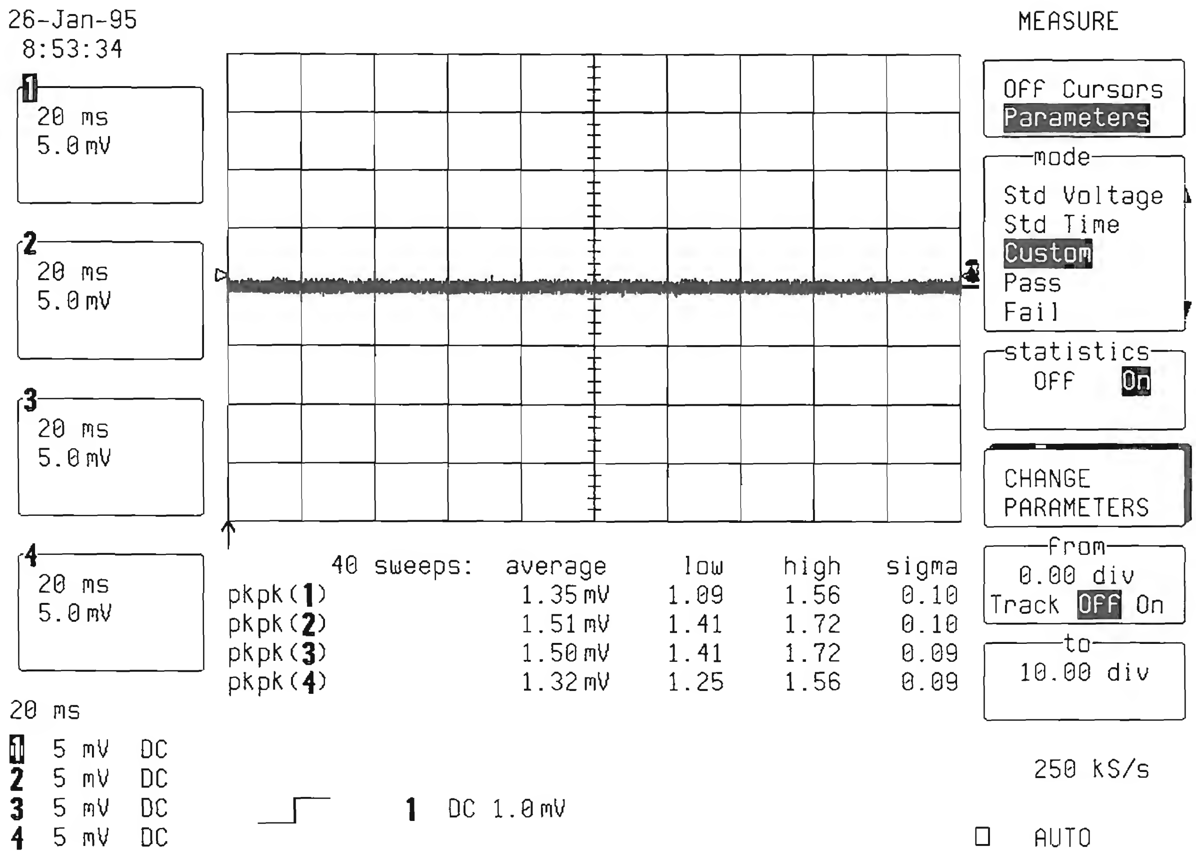
- Input gain : **5 mV/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Holdoff : **Off**
- Trigger Mode : **Auto**
- Timebase : **20 msec/div.**
- Channel use : **4**
- Record up : **50 K**

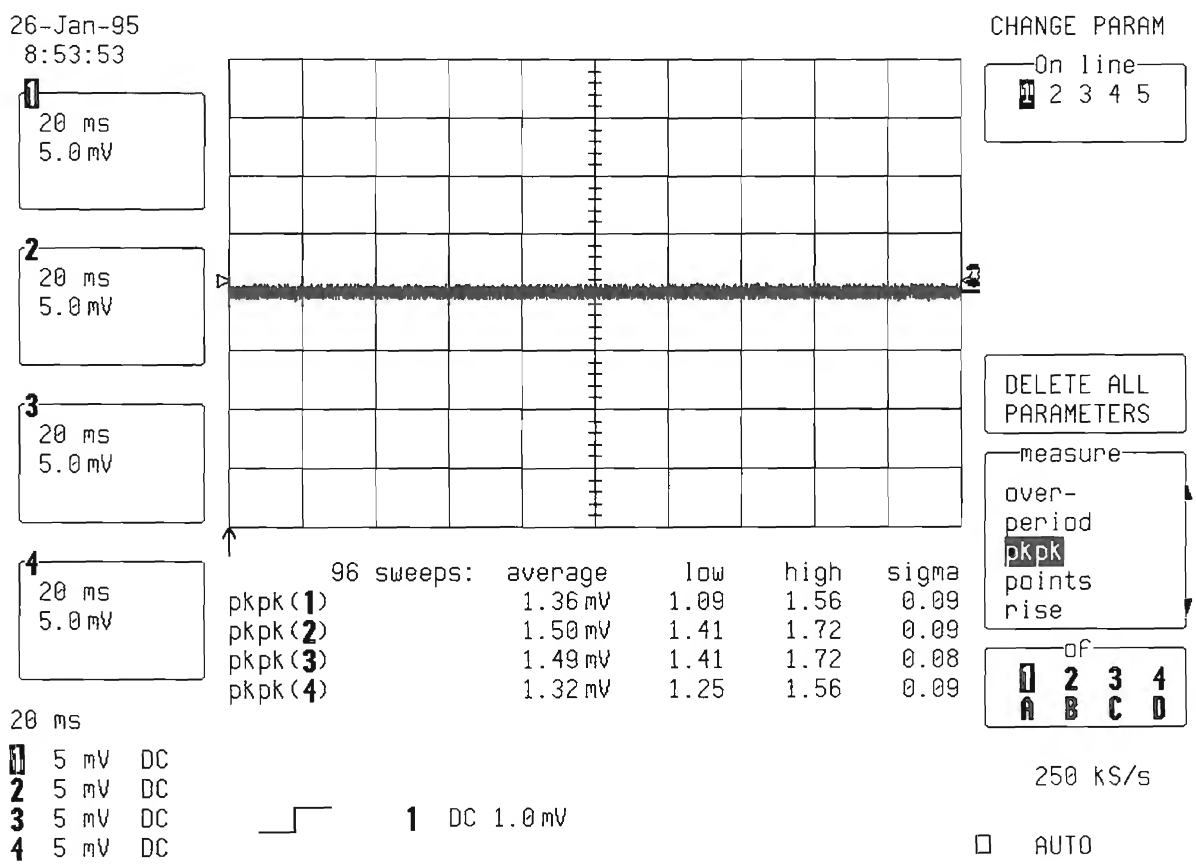


- Press : **Cursors/Measure**
- Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**

- Change parameters

- On line 1 : **Measure pkpk of Ch1**
- On line 2 : **Measure pkpk of Ch2**
- On line 3 : **Measure pkpk of Ch3**
- On line 4 : **Measure pkpk of Ch4**


26-Jan-95
8:53:34
MEASURE
1 20 ms 5.0 mV
2 20 ms 5.0 mV
3 20 ms 5.0 mV
4 20 ms 5.0 mV
Off Cursors Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
CHANGE PARAMETERS
from
0.00 div
Track Off On
to
10.00 div
40 sweeps: average low high sigma
pkpk(1) 1.35 mV 1.09 1.56 0.10
pkpk(2) 1.51 mV 1.41 1.72 0.10
pkpk(3) 1.50 mV 1.41 1.72 0.09
pkpk(4) 1.32 mV 1.25 1.56 0.09
20 ms
1 5 mV DC
2 5 mV DC
3 5 mV DC
4 5 mV DC
1 DC 1.0 mV
250 kS/s
AUTO


26-Jan-95
8:53:53
CHANGE PARAM
1 20 ms 5.0 mV
2 20 ms 5.0 mV
3 20 ms 5.0 mV
4 20 ms 5.0 mV
On line
1 2 3 4 5
DELETE ALL PARAMETERS
measure
over-
period
pkpk
points
rise
of
1 2 3 4
A B C D
96 sweeps: average low high sigma
pkpk(1) 1.36 mV 1.09 1.56 0.09
pkpk(2) 1.50 mV 1.41 1.72 0.09
pkpk(3) 1.49 mV 1.41 1.72 0.08
pkpk(4) 1.32 mV 1.25 1.56 0.09
20 ms
1 5 mV DC
2 5 mV DC
3 5 mV DC
4 5 mV DC
1 DC 1.0 mV
250 kS/s
AUTO

- Check after at least 100 sweeps that : high pkpk readout is less than ± **3.6 mV**, corresponding to **9% of full scale**.

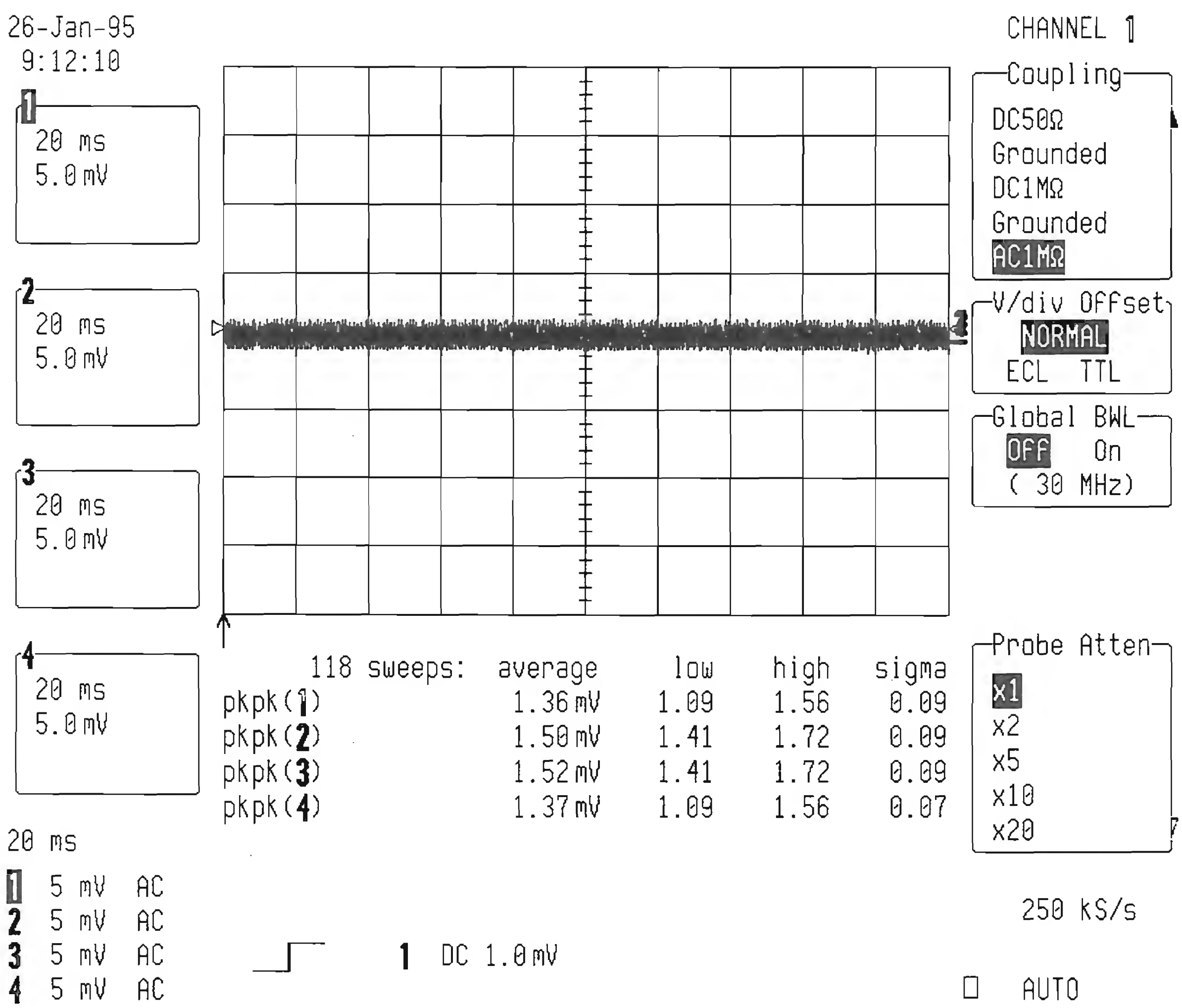
- Repeat the test for Timebase : **2 msec/div**, **.2 msec/div**, **20 µsec/div**, and **10 µsec/div.** and check as above.

5.6.1.b AC 1MΩ

- Select Coupling Ch1, Ch2, Ch3, Ch4 : **AC 1MΩ**

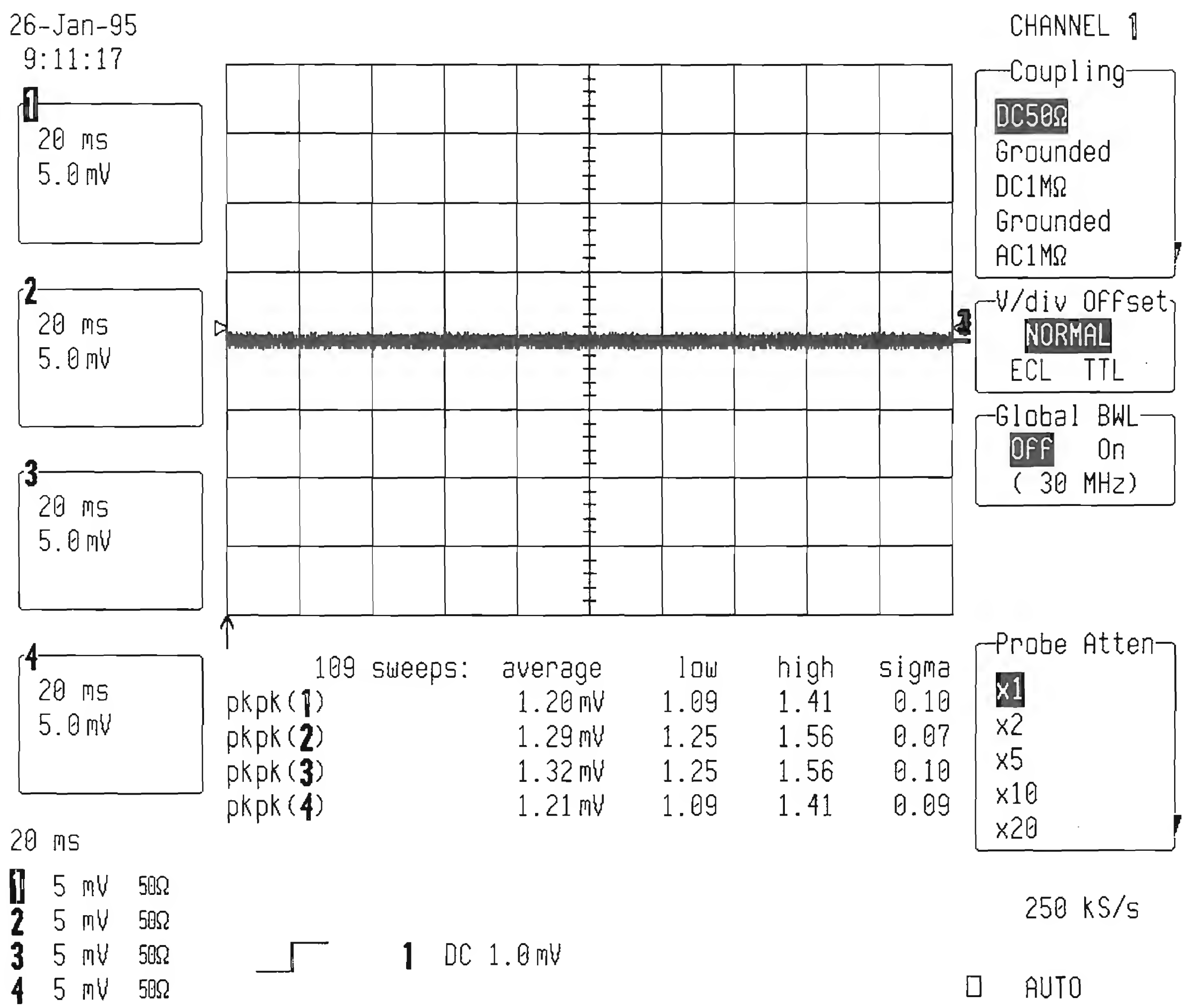
- Check after at least 100 sweeps that the high pkpk readout is less than ± **3.6 mV**, corresponding to **9% of full scale**.

- Repeat the test for Timebase : **2 msec/div**, **.2 msec/div**, **20 µsec/div**, and **10 µsec/div.** and check as above.



5.6.1.c DC 50Ω

- Select Coupling Ch1, Ch2, Ch3, Ch4 : **DC 50Ω**
- Check after at least 100 sweeps that the high pkpk readout is less than ± **3.6 mV**, corresponding to **9% of full scale**.
- Repeat the tests for Timebase : **2 msec/div**, **.2 msec/div**, **20 µsec/div**, and **10 µsec/div.** and check as above.



5.6.2 Rms Noise

Specifications

< ± 360 μV at 5 mV/div.

5.6.2.a DC 1MΩ

Procedure

- With no signal connected to the inputs, set 9354A/T DSO settings as follows :

- Turn on traces : **Ch1, Ch2, Ch3, Ch4**
- Display setup : **Standard, Dot Join on, Persistence off, Single grid**
- Input Coupling : **DC 1MΩ**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Global BWL : **Off**
- Input gain : **5 mV/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Holdoff : **Off**
- Trigger Mode : **Auto**
- Timebase : **20 msec/div.**
- Channel use : **4**
- Record up : **50 K**

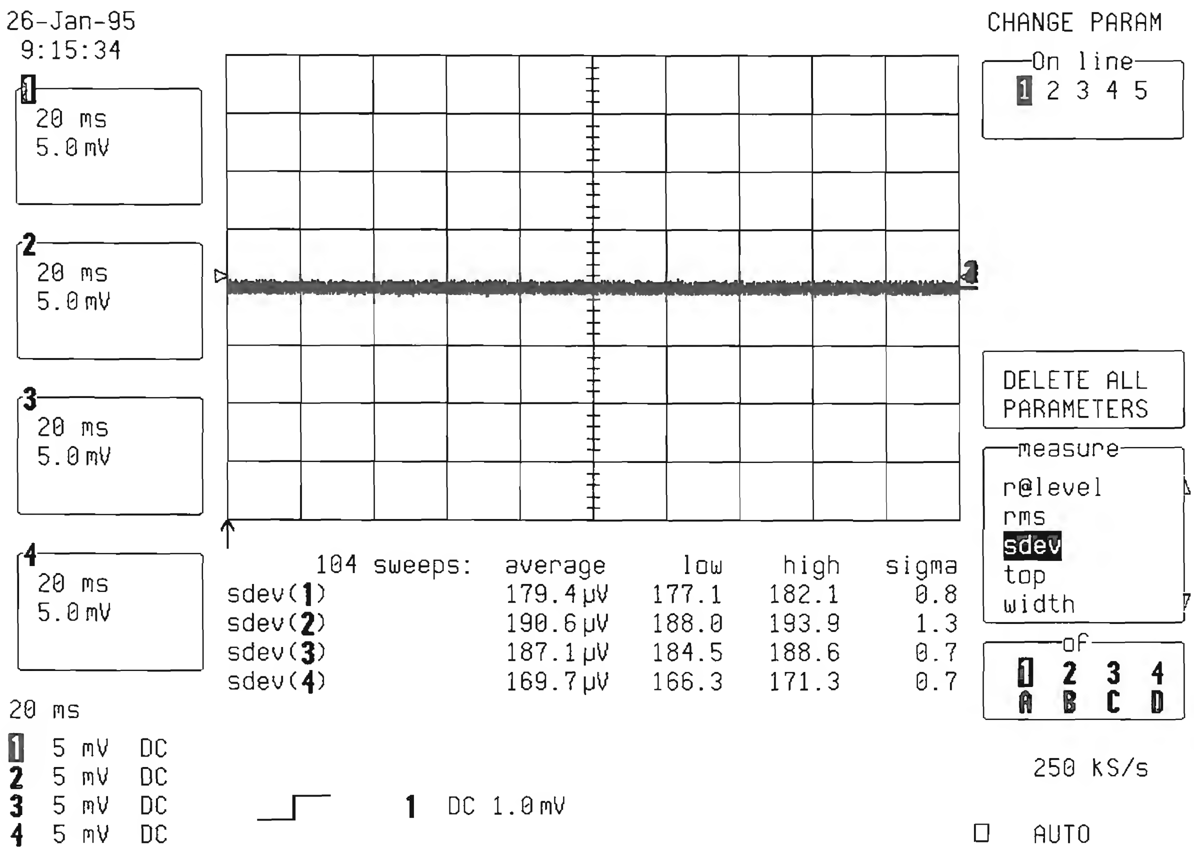
- Press : **Cursors/Measure**
- Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**

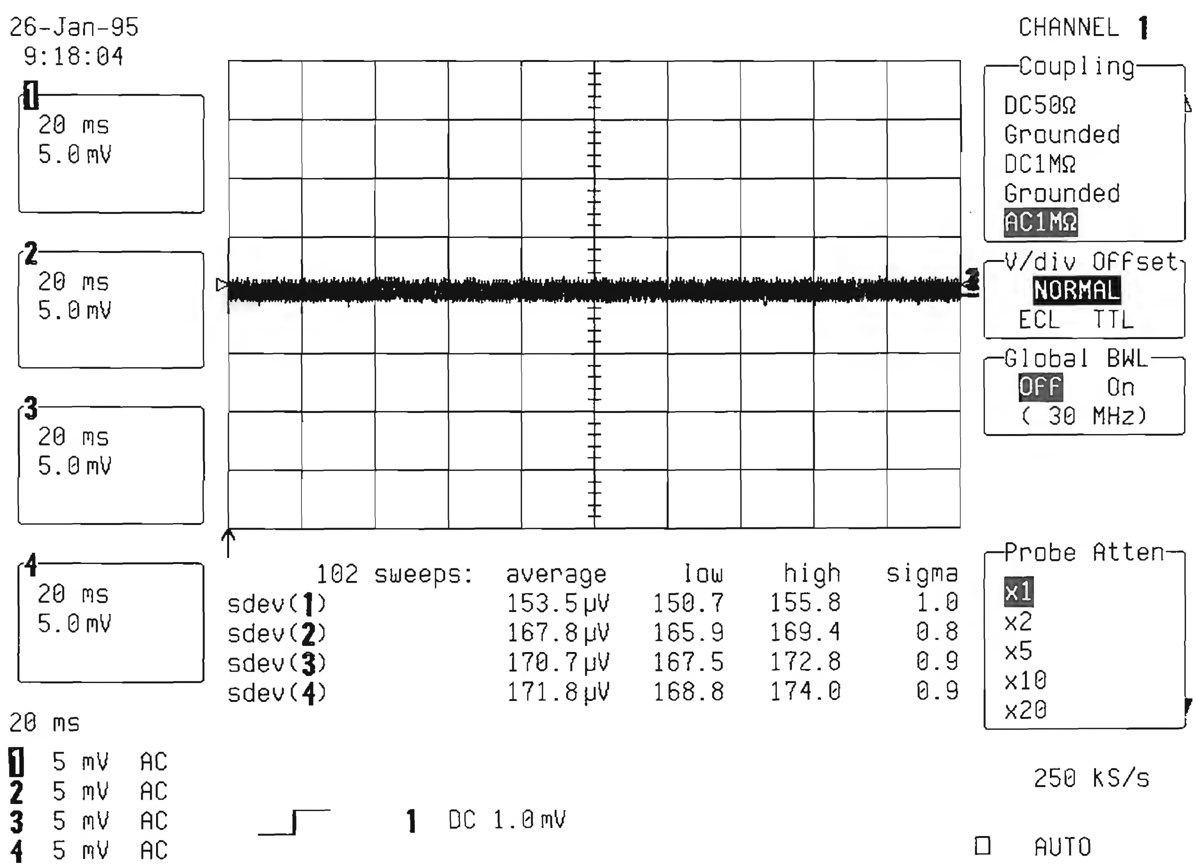
- Change parameters

- On line 1 : **Measure sdev of Ch1**
- On line 2 : **Measure sdev of Ch2**
- On line 3 : **Measure sdev of Ch3**
- On line 4 : **Measure sdev of Ch4**

- Check after at least 100 sweeps that : high sdev readout is less than ± **360 μV**, corresponding to **0.9% of full scale**.

- Repeat the test for Timebase : **2 msec/div**, **.2 msec/div**, **20 μsec/div**, and **10 μsec/div.** and check as above.


26-Jan-95
9:15:34
CHANGE PARAM
On line
1 2 3 4 5
1 20 ms 5.0 mV
2 20 ms 5.0 mV
3 20 ms 5.0 mV
4 20 ms 5.0 mV
DELETE ALL PARAMETERS
measure
r@level
rms
sdev
top
width
of
1 2 3 4
A B C D
104 sweeps: average low high sigma
sdev(1) 179.4 μV 177.1 182.1 0.8
sdev(2) 190.6 μV 188.0 193.9 1.3
sdev(3) 187.1 μV 184.5 188.6 0.7
sdev(4) 169.7 μV 166.3 171.3 0.7
20 ms
1 5 mV DC
2 5 mV DC
3 5 mV DC
4 5 mV DC
1 DC 1.0 mV
250 kS/s
AUTO

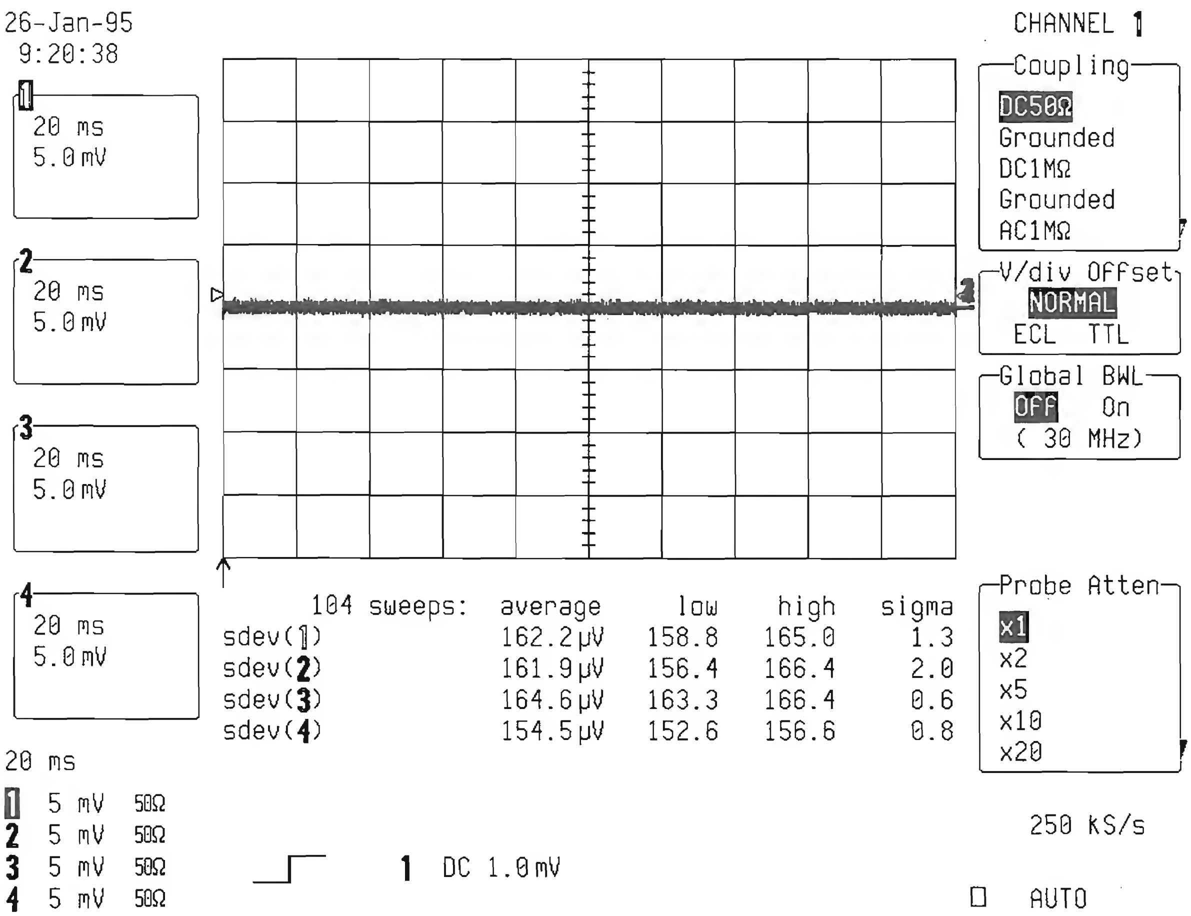

26-Jan-95
9:18:04
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
1 20 ms 5.0 mV
2 20 ms 5.0 mV
3 20 ms 5.0 mV
4 20 ms 5.0 mV
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
102 sweeps: average low high sigma
sdev(1) 153.5 μV 150.7 155.8 1.0
sdev(2) 167.8 μV 165.9 169.4 0.8
sdev(3) 170.7 μV 167.5 172.8 0.9
sdev(4) 171.8 μV 168.8 174.0 0.9
20 ms
1 5 mV AC
2 5 mV AC
3 5 mV AC
4 5 mV AC
1 DC 1.0 mV
250 kS/s
AUTO

5.6.2.b AC 1MΩ

- Select Coupling Ch1, Ch2, Ch3, Ch4 : **AC 1MΩ**
- Check after at least 100 sweeps that the high pkpk readout is less than ± **360 µV**, corresponding to **0.9% of full scale**.
- Repeat the test for Timebase : **2 msec/div, .2 msec/div, 20 µsec/div**, and **10 µsec/div.** and check as above.

5.6.2.c DC 50Ω

- Select Coupling Ch1, Ch2, Ch3, Ch4 : **DC 50Ω**
- Check after at least 100 sweeps that the high pkpk readout is less than ± **360 µV**, corresponding to **0.9% of full scale**.
- Repeat the tests for Timebase : **2 msec/div, .2 msec/div, 20 µsec/div**, and **10 µsec/div. and check as above.**



5.6.3 Inputs Grounded

With no cable plugged into scope, set the DSO as follows :

- Turn on trace : **Channel 1, Channel 2, Channel 3, Channel 4**
- Input Coupling : **DC 50Ω**
- Input gain : **10 mV/div.**
- Offset : **Zero**
- Trigger on : **Channel 1, DC**
- Trigger mode : **Auto**
- Timebase : **50 µsec/div.**
- Channel use : **4**
- Record up : **50 K**
- Turn off trace : **Channel 1, Channel 2, Channel 3, Channel 4**

- Turn on trace : **A, B, C, D**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A, B, C, D : **Channel 1, Channel 2, Channel 3, Channel 4**
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- For : **1000 sweeps**

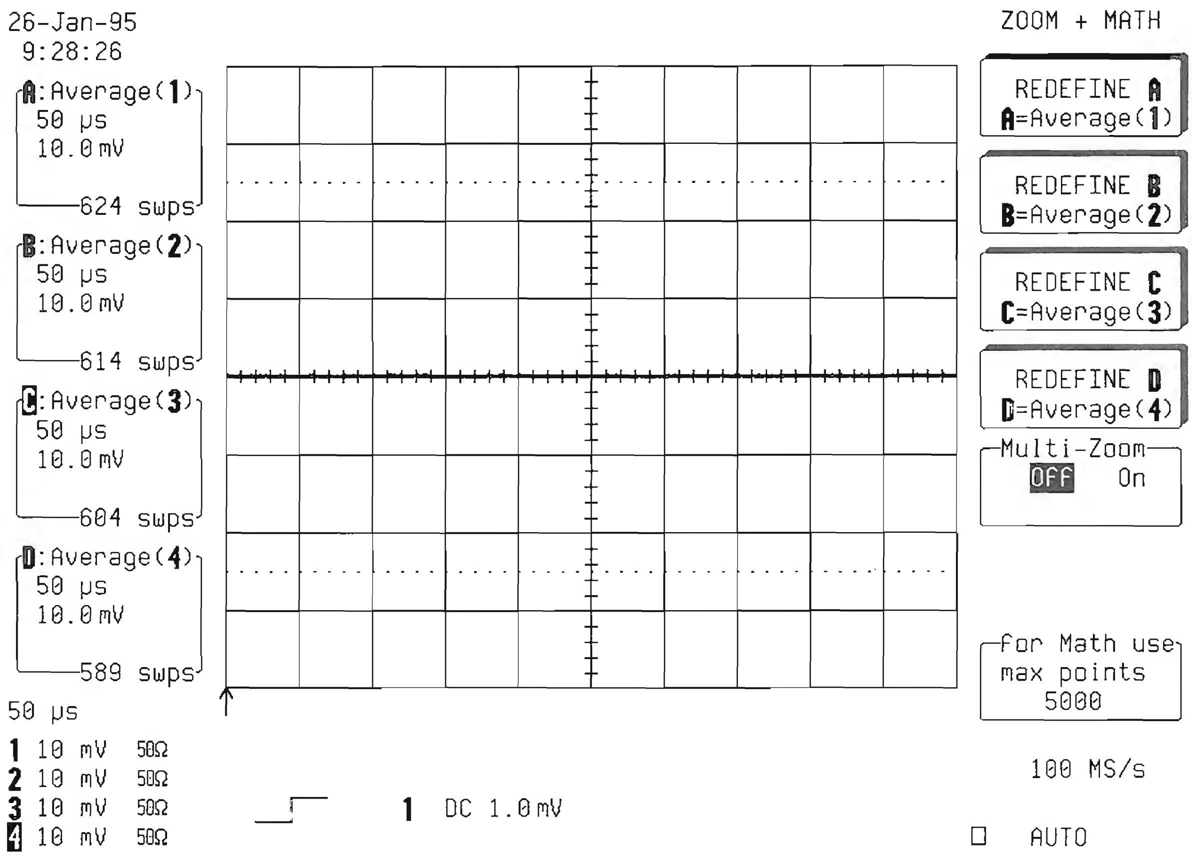
- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Statistics : **off**
- Change parameters
- On line 1 : **Measure mean of A**
- On line 2 : **Measure mean of B**
- On line 3 : **Measure mean of C**
- On line 4 : **Measure mean of D**

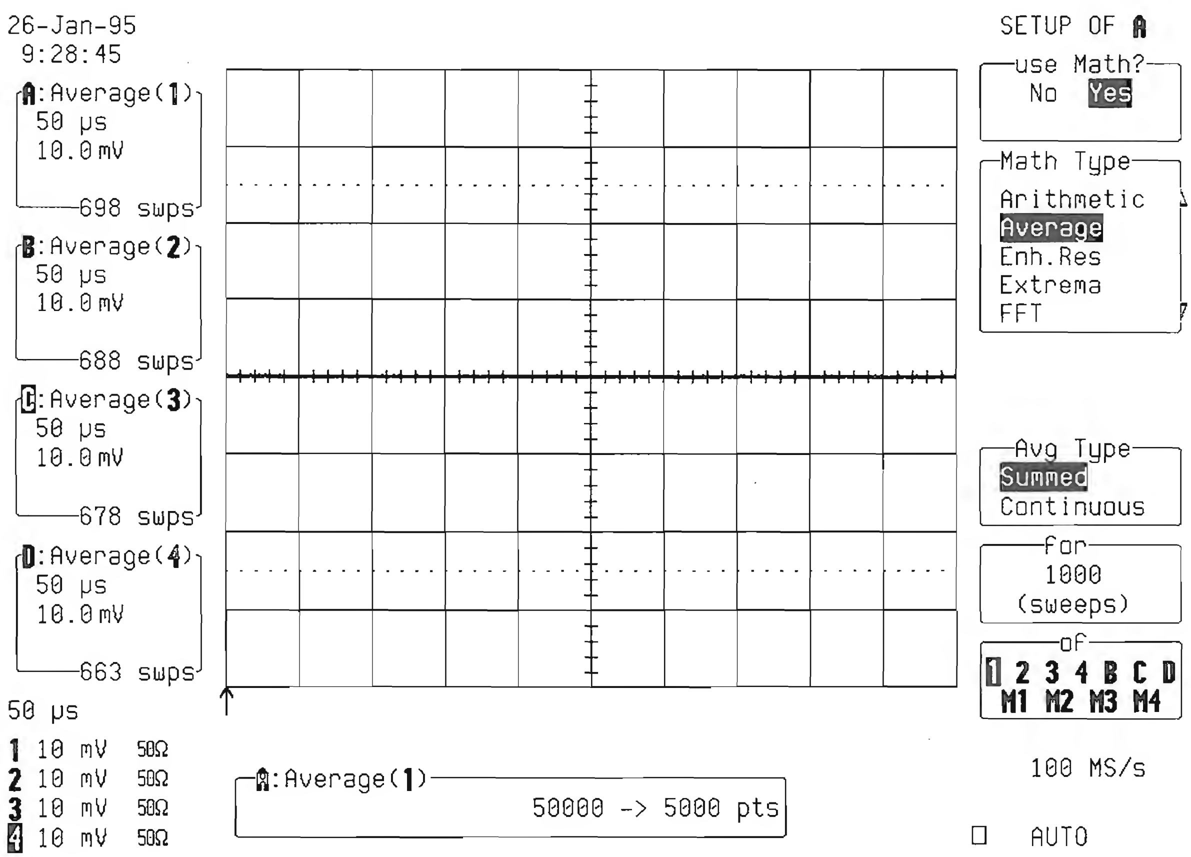
- Check after at least 100 sweeps that the **mean** value of **A**, **B**, **C**, **D** is less than **±1.6 mV,** corresponding to ± 2% of full scale.

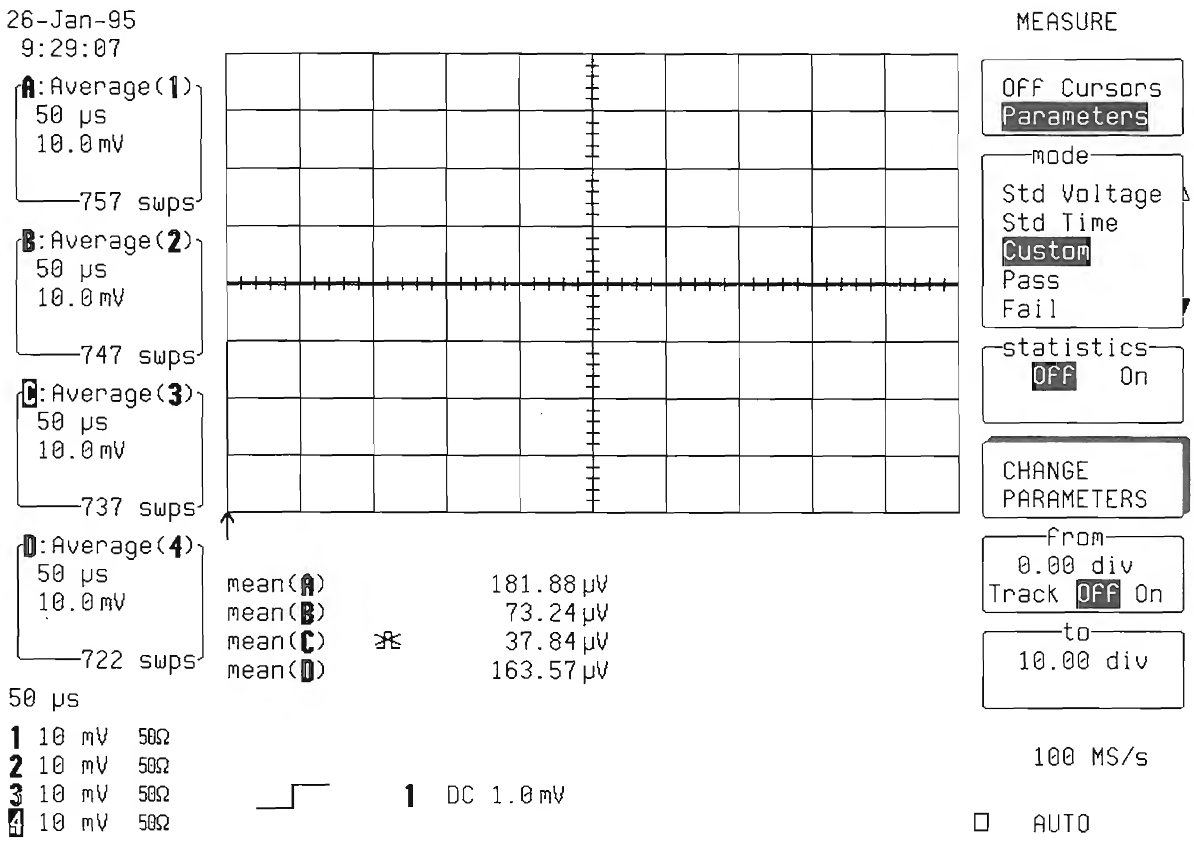
- Switch Channel 1, Channel 2, Channel 3 and Channel 4, between coupling **DC 50Ω** and **Grounded**.
- Check after at least 100 sweeps that the **mean** value of **A**, **B**, **C**, **D** is less than **±1.6 mV,** corresponding to ± 2% of full scale.

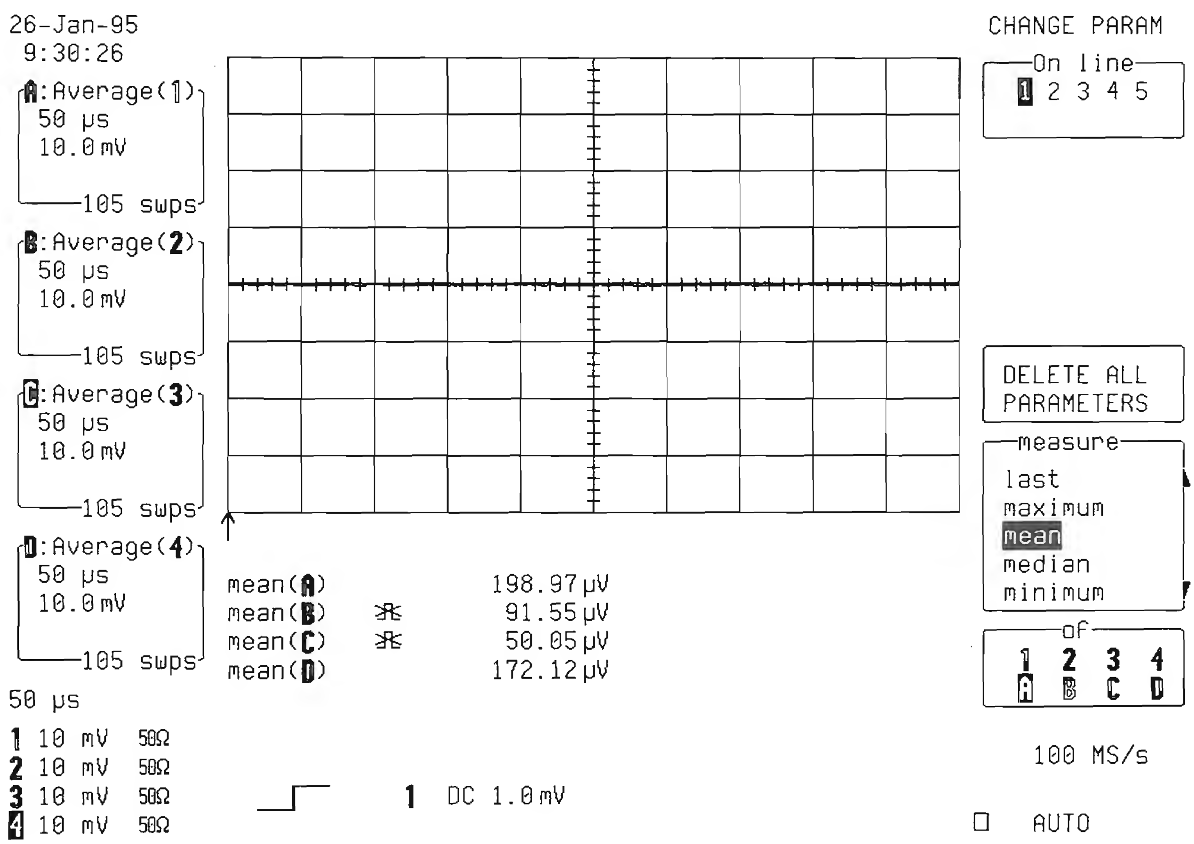
- Set coupling all Channel : **DC 1MΩ**
- Check after at least 100 sweeps that the **mean** value of **A**, **B**, **C**, **D** is less than **±1.6 mV,** corresponding to ± 2% of full scale.

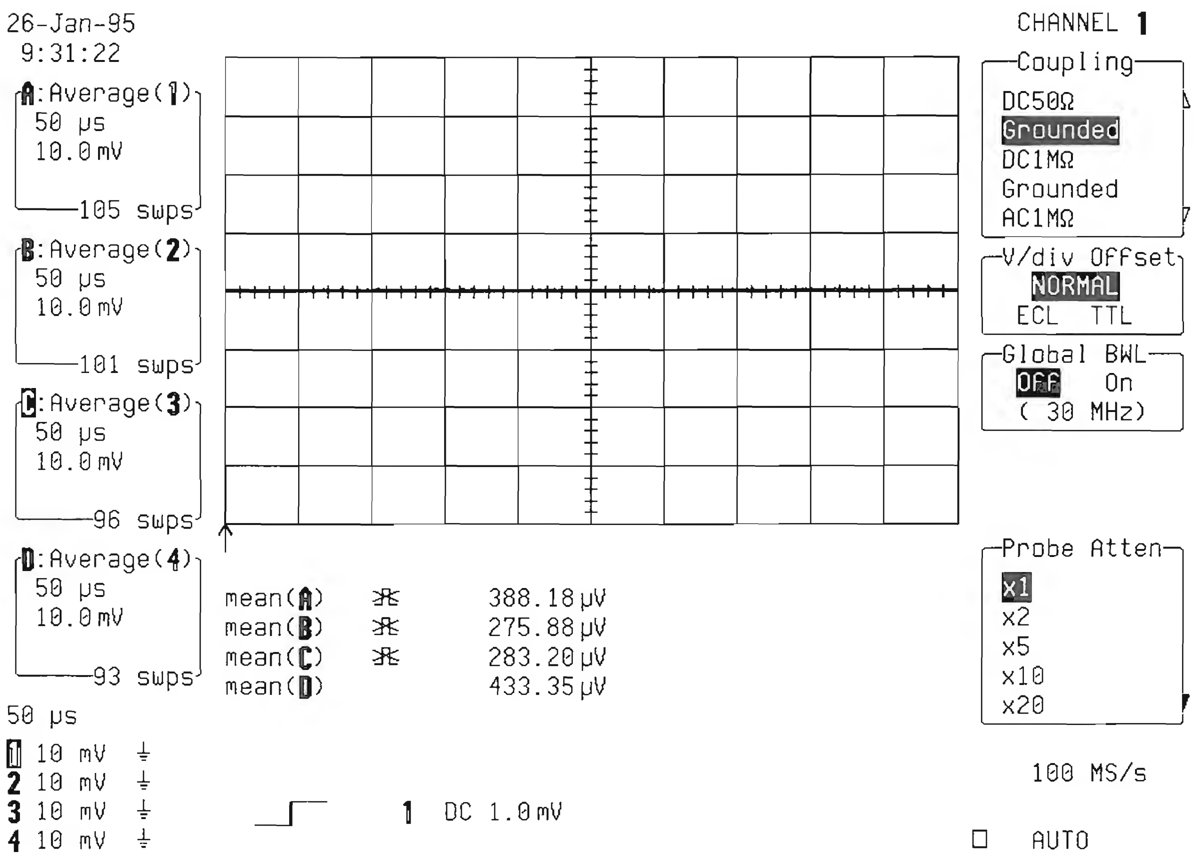
- Switch all Channel between coupling **DC 1MΩ and Grounded**.
- Check after at least 100 sweeps that the **mean** value of **A**, **B**, **C**, **D** is less than **±1.6 mV,** corresponding to ± 2% of full scale.

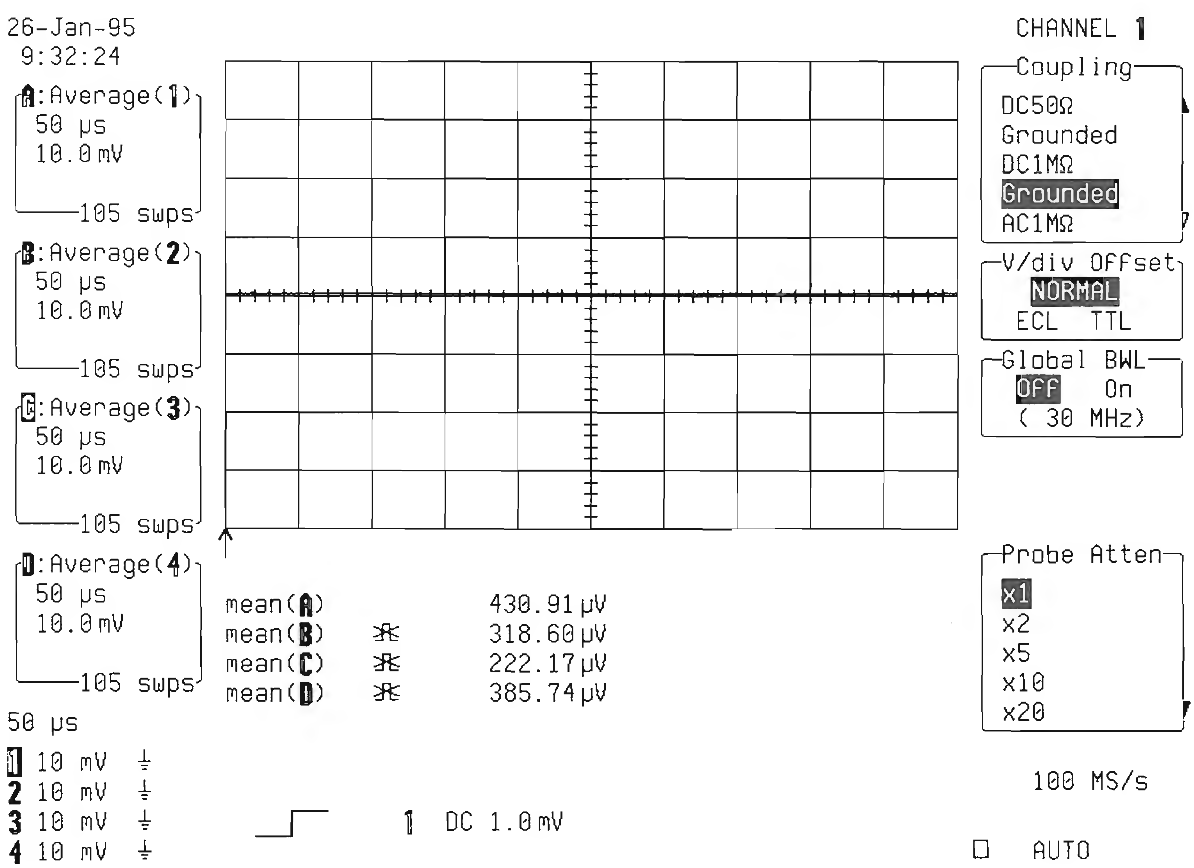

26-Jan-95
9:28:26
A:Average(1)
50 µs
10.0 mV
624 swps
B:Average(2)
50 µs
10.0 mV
614 swps
C:Average(3)
50 µs
10.0 mV
604 swps
D:Average(4)
50 µs
10.0 mV
589 swps
50 µs
1 10 mV 50Ω
2 10 mV 50Ω
3 10 mV 50Ω
4 10 mV 50Ω
1 DC 1.0 mV
ZOOM + MATH
REDEFINE A
A=Average(1)
REDEFINE B
B=Average(2)
REDEFINE C
C=Average(3)
REDEFINE D
D=Average(4)
Multi-Zoom
Off On
for Math use
max points
5000
100 MS/s
AUTO


26-Jan-95
9:28:45
A:Average(1)
50 µs
10.0 mV
698 swps
B:Average(2)
50 µs
10.0 mV
688 swps
C:Average(3)
50 µs
10.0 mV
678 swps
D:Average(4)
50 µs
10.0 mV
663 swps
50 µs
1 10 mV 50Ω
2 10 mV 50Ω
3 10 mV 50Ω
4 10 mV 50Ω
A:Average(1)
50000 -> 5000 pts
SETUP OF A
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 B C D
M1 M2 M3 M4
100 MS/s
AUTO


26-Jan-95
9:29:07
A:Average(1)
50 µs
10.0 mV
757 swps
B:Average(2)
50 µs
10.0 mV
747 swps
C:Average(3)
50 µs
10.0 mV
737 swps
D:Average(4)
50 µs
10.0 mV
722 swps
50 µs
1 10 mV 50Ω
2 10 mV 50Ω
3 10 mV 50Ω
4 10 mV 50Ω
mean(A) 181.88 µV
mean(B) 73.24 µV
mean(C) 37.84 µV
mean(D) 163.57 µV
1 DC 1.0 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
CHANGE
PARAMETERS
from
0.00 div
Track Off On
to
10.00 div
100 MS/s
AUTO


26-Jan-95
9:30:26
A:Average(1)
50 µs
10.0 mV
105 swps
B:Average(2)
50 µs
10.0 mV
105 swps
C:Average(3)
50 µs
10.0 mV
105 swps
D:Average(4)
50 µs
10.0 mV
105 swps
50 µs
1 10 mV 50Ω
2 10 mV 50Ω
3 10 mV 50Ω
4 10 mV 50Ω
mean(A) 198.97 µV
mean(B) 91.55 µV
mean(C) 50.05 µV
mean(D) 172.12 µV
1 DC 1.0 mV
CHANGE PARAM
On line
1 2 3 4 5
DELETE ALL
PARAMETERS
measure
last
maximum
mean
median
minimum
of
1 2 3 4
A B C D
100 MS/s
AUTO


26-Jan-95
9:31:22
A: Average(1)
50 µs
10.0 mV
105 swps
B: Average(2)
50 µs
10.0 mV
101 swps
C: Average(3)
50 µs
10.0 mV
96 swps
D: Average(4)
50 µs
10.0 mV
93 swps
50 µs
1 10 mV
2 10 mV
3 10 mV
4 10 mV
mean(A) 388.18 µV
mean(B) 275.88 µV
mean(C) 283.20 µV
mean(D) 433.35 µV
1 DC 1.0 mV
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
100 MS/s
AUTO


26-Jan-95
9:32:24
A: Average(1)
50 µs
10.0 mV
105 swps
B: Average(2)
50 µs
10.0 mV
105 swps
C: Average(3)
50 µs
10.0 mV
105 swps
D: Average(4)
50 µs
10.0 mV
105 swps
50 µs
1 10 mV
2 10 mV
3 10 mV
4 10 mV
mean(A) 430.91 µV
mean(B) 318.60 µV
mean(C) 222.17 µV
mean(D) 385.74 µV
1 DC 1.0 mV
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
100 MS/s
AUTO

5.7 DC Linearity

Specification

≤ ± 2 % of full scale at 0 mV offset

5.7.1 Description

This test measures the DC Accuracy within the gain range specified.
The parameters Std voltage are used to measure the amplitude of the DC input signal.

In the absence of the computer automated calibration system based on LeCroy Calibration Software (LeCalsoft) for the 9354A/T model oscilloscope, the manual performance test procedure can be followed to establish a traceable calibration, provided that the measurement instruments used are themselves traceable.
For such calibration, follow the manual linearity test procedure using a calibrated and certified high precision (better than 0.1 %) voltage source, for example TEK PS5004 or equivalent, or use a certified DMM to measure the applied voltage.

5.7.1.a DC 50Ω

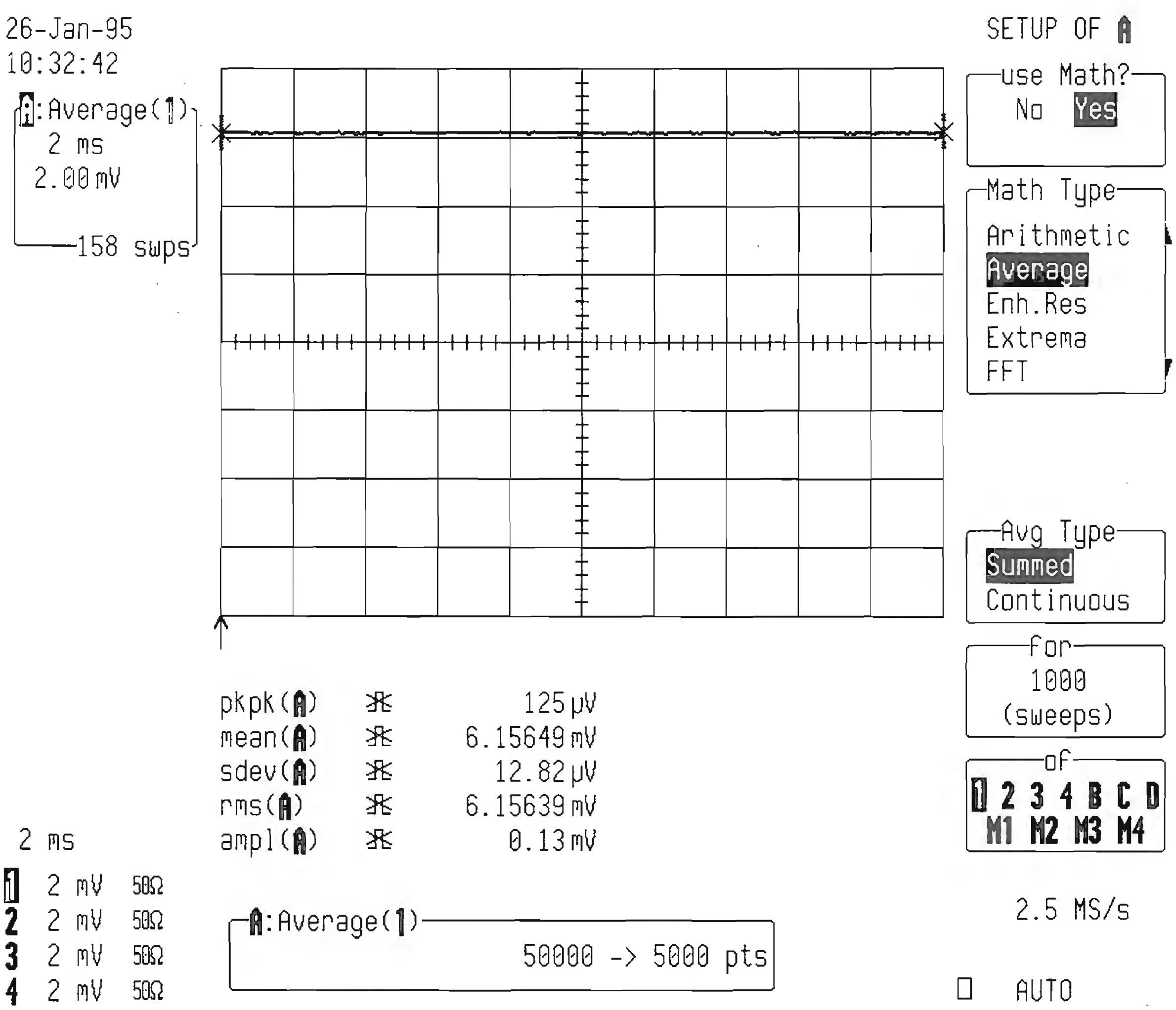
Procedure

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **0.0 mV**
- Input gain : **from 2mV/div to 5 V/div.** (see table 5-2 and 5-3)
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Auto**
- Holdoff : **Off**
- Timebase : **2 msec/div.**
- Channel use : **4**
- Record up : **50 K**
- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- For : **1000 sweeps**
- Of : **Channel 1**

- Turn off trace : **Channel 1**
- Cursors/Measure : **Parameters**
- Mode : **Std Voltage**
- Statistics : **off**
- on displayed trace : **A**

5.7.1.a.1 Positive DC Linearity

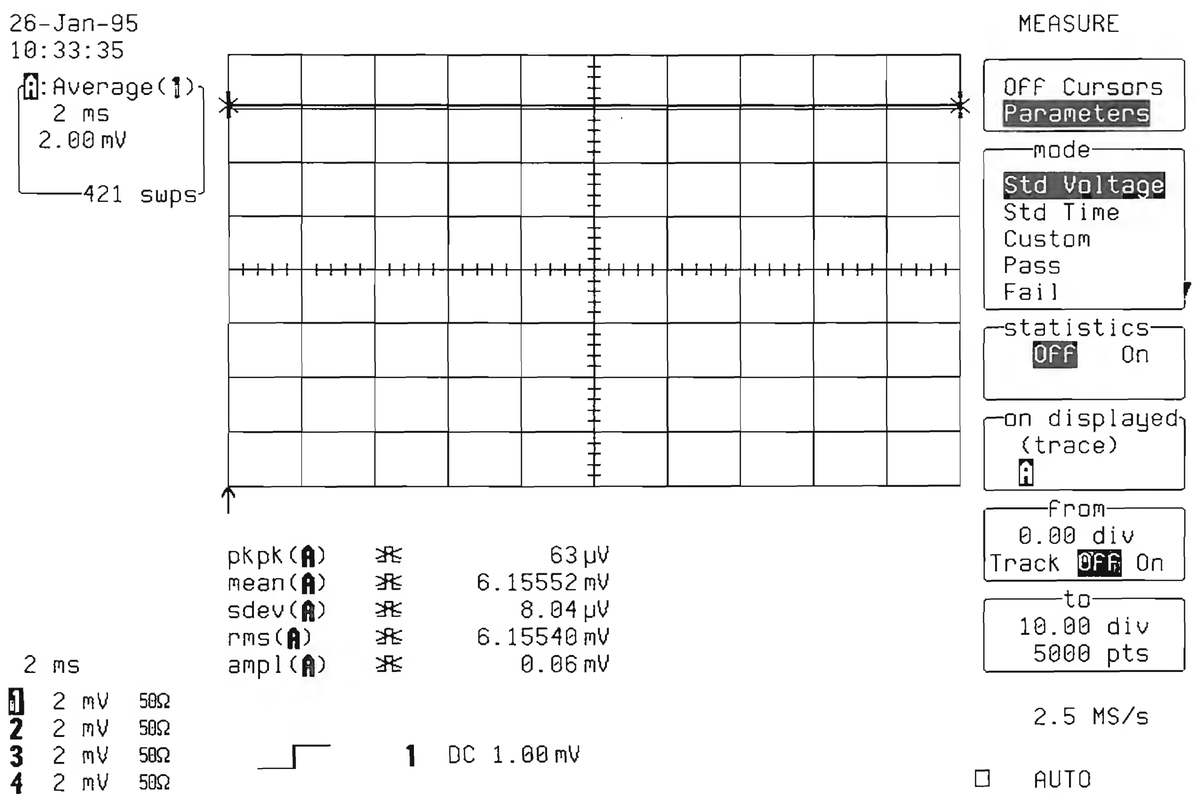
- For the ranges **2 mV/div. to 1 V/div.**, from the high precision voltage source, apply to Channel 1 : + **3 major screen divisions**.
- For the low sensitivities : **2 mV, 5 mV, 10 mV, 20 mV** and **50 mV/div.**, use a **50 Ohm 20 dB** attenuator.
- For the range **2V/div. and 5V/div.**, the maximum input voltage is + **5 V**.

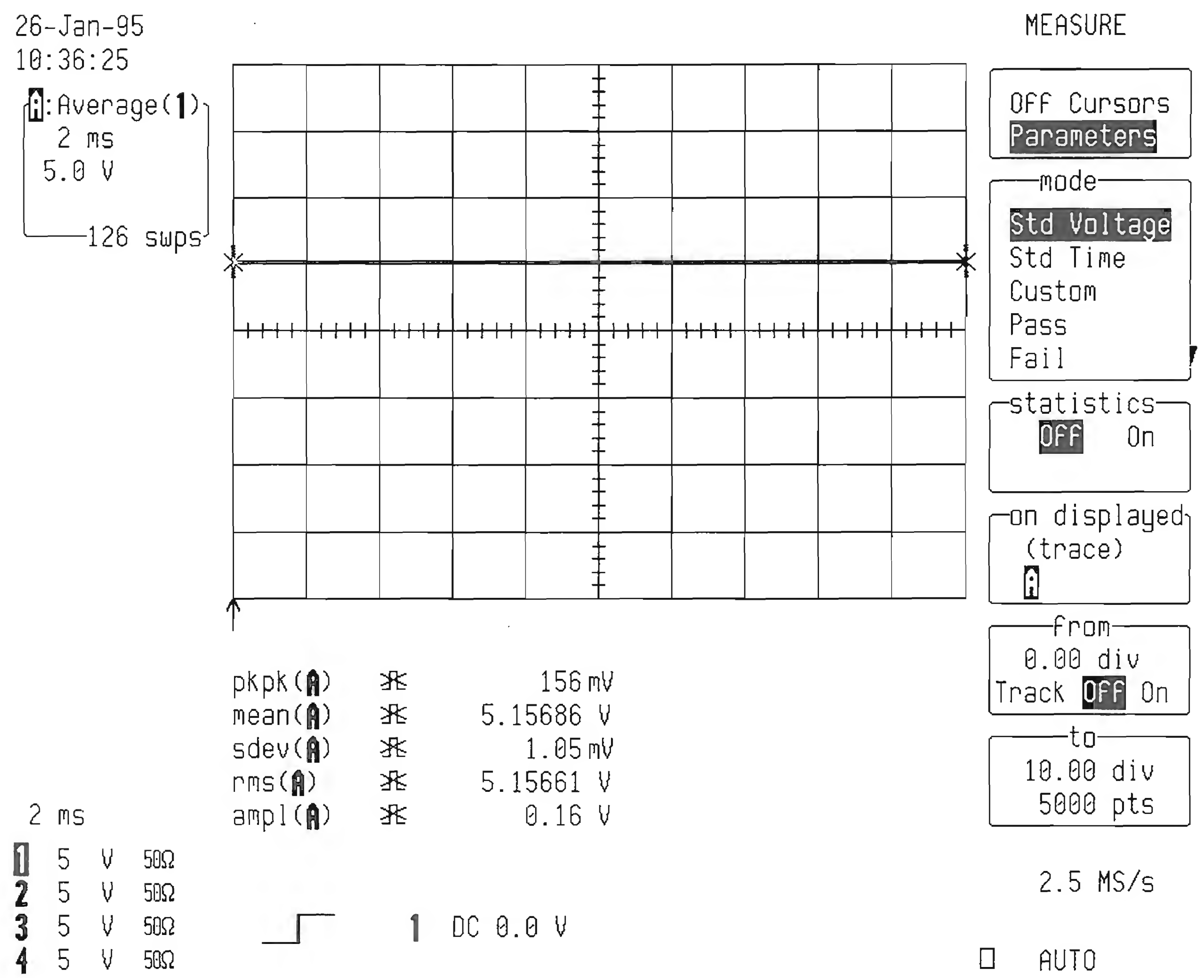


Range	**Attenuator**	**Conditions of Test**			**Average Mean Parameter Reading**		
Volts/div Control	20 dB	PS Output	9354A/T Input	9354A/T Full scale	Min Value -X % of FS	Max Value +X% of FS	X%
2 mV	Yes	+ 60 mV	+ 6 mV	16 mV	+ 5.2 mV	+ 6.8 mV	5%
5 mV	Yes	+ 150 mV	+ 15 mV	40 mV	+ 13.8 mV	+ 16.2 mV	3%
10 mV	Yes	+ 300 mV	+ 30 mV	80 mV	+ 28.4 mV	+ 31.6 mV	2%
20 mV	Yes	+ 600 mV	+ 60 mV	160 mV	+ 56.8 mV	+ 63.2 mV	2%
50 mV	Yes	+ 1.5 V	+150 mV	400 mV	+ 142 mV	+ 158 mV	2%
.1 V	No	+ 300 mV	+ 300 mV	800 mV	+ 284 mV	+ 316 mV	2%
.2 V	No	+ 600 mV	+ 600 mV	1.6 v	+ 568 mV	+ 632 mV	2%
.5 V	No	+ 1.5 V	+ 1.5 V	4 V	+ 1.42 V	+ 1.58 V	2%
1 V	No	+ 3 V	+ 3 V	8 V	+ 2.84 V	+ 3.16 V	2%
2 V	No	Max +5 V	Max +5 V	16 V	+ 4.68 V	+ 5.32 V	2%
5 V	No	Max +5 V	Max +5 V	40 V	+ 4.20 V	+ 5.80 V	2%

Table 5-2 : Positive DC Linearity Readout Accuracy

- For each point, read off the **Mean** parameter voltage, and compare it to the digital readout of the voltage reference
- The **Mean** parameter reading should be within the limits shown in table 5-2.





5.7.1.a.2 Negative DC Linearity

- For the ranges **2 mV/div. to 1 V/div.**, from the high precision voltage source, apply to Channel 1 : **- 3 major screen divisions**.

- For the low sensitivities : **2 mV, 5 mV, 10 mV, 20 mV** and **50 mV/div.**, use a **50Ω 20 dB** attenuate.

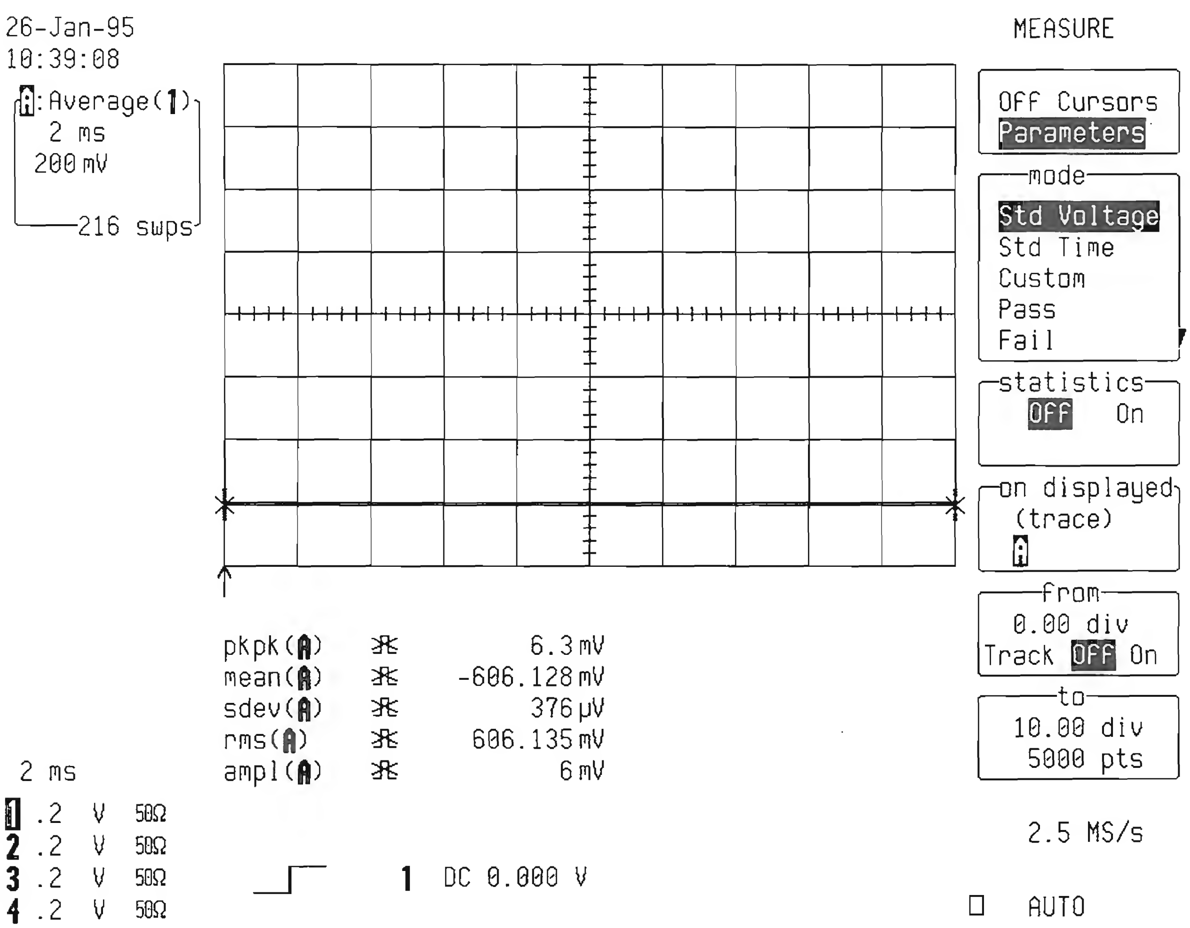
- For the range **2V/div. and 5V/div.**, the minimum input voltage is **- 5 V**.

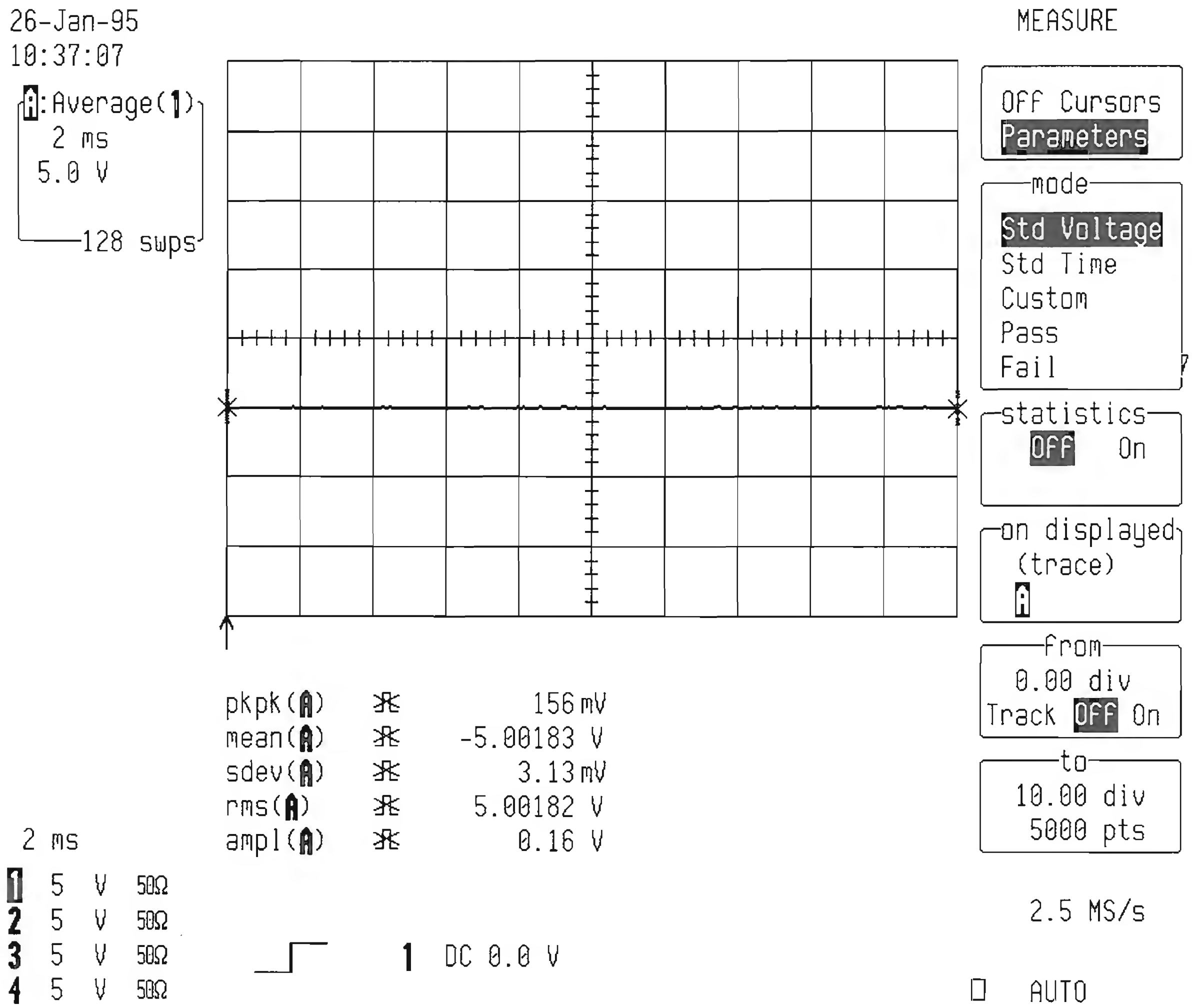
- For each point, read off the **Mean** parameter voltage, and compare it to the digital readout of the voltage reference.

- The **mean** parameter reading should be within the limits shown in table 5-3.

Range	Attenuator	Conditions of Test			Average Mean Parameter Reading		
Volts/div Control	20 dB	PS Output	9354A/T Input	9354A/T Full scale	Min Value -X % of FS	Max Value +X% of FS	X%
2 mV	Yes	- 60 mV	- 6 mV	16 mV	- 5.2 mV	- 6.8 mV	5%
5 mV	Yes	- 150 mV	- 15 mV	40 mV	- 13.8 mV	- 16.2 mV	3%
10 mV	Yes	- 300 mV	- 30 mV	80 mV	- 28.4 mV	- 31.6 mV	2%
20 mV	Yes	- 600 mV	- 60 mV	160 mV	- 56.8 mV	- 63.2 mV	2%
50 mV	Yes	- 1.5 V	-150 mV	400 mV	- 142 mV	- 158 mV	2%
.1 V	No	- 300 mV	- 300 mV	800 mV	- 284 mV	- 316 mV	2%
.2 V	No	- 600 mV	- 600 mV	1.6 v	- 568 mV	- 632 mV	2%
.5 V	No	- 1.5 V	- 1.5 V	4 V	- 1.42 V	- 1.58 V	2%
1 V	No	- 3 V	- 3 V	8 V	- 2.84 V	- 3.16 V	2%
2 V	No	Max -5 V	Max -5 V	16 V	- 4.68 V	- 5.32 V	2%
5 V	No	Max -5 V	Max -5 V	40 V	- 4.20 V	- 5.80 V	2%

Table 5-3 : Negative DC Linearity Readout Accuracy





5.7.1.b DC 1MΩ

Set the DSO as follows :

- Input Coupling : **DC 1MΩ**
- Input offset : **0.0 mV**
- Input gain : **from 2mV/div. to 5 V/div.**

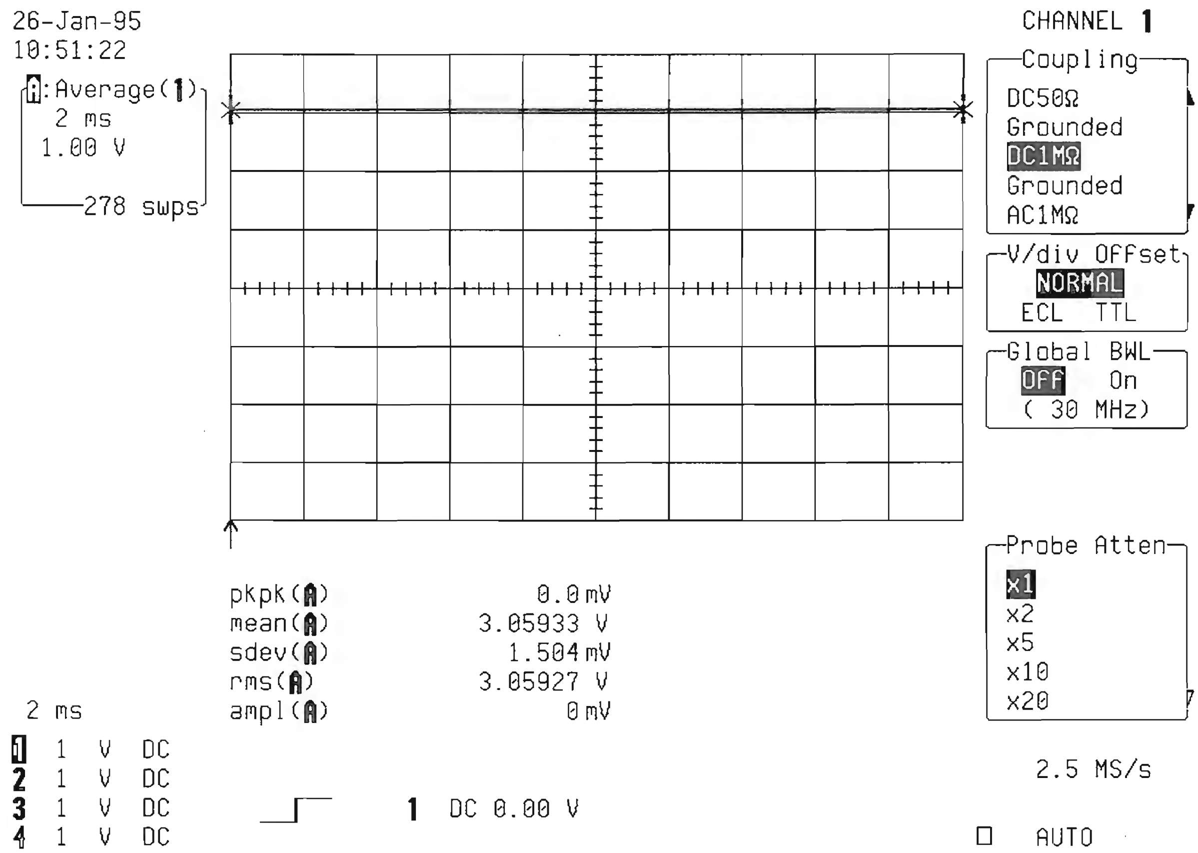
- For the ranges **2 mV/div. to 5 V/div.**, from the high precision voltage source, apply to Channel 1 the following 2 voltages values, one after another : **+ 3 major** screen divisions, **- 3 major** screen divisions.

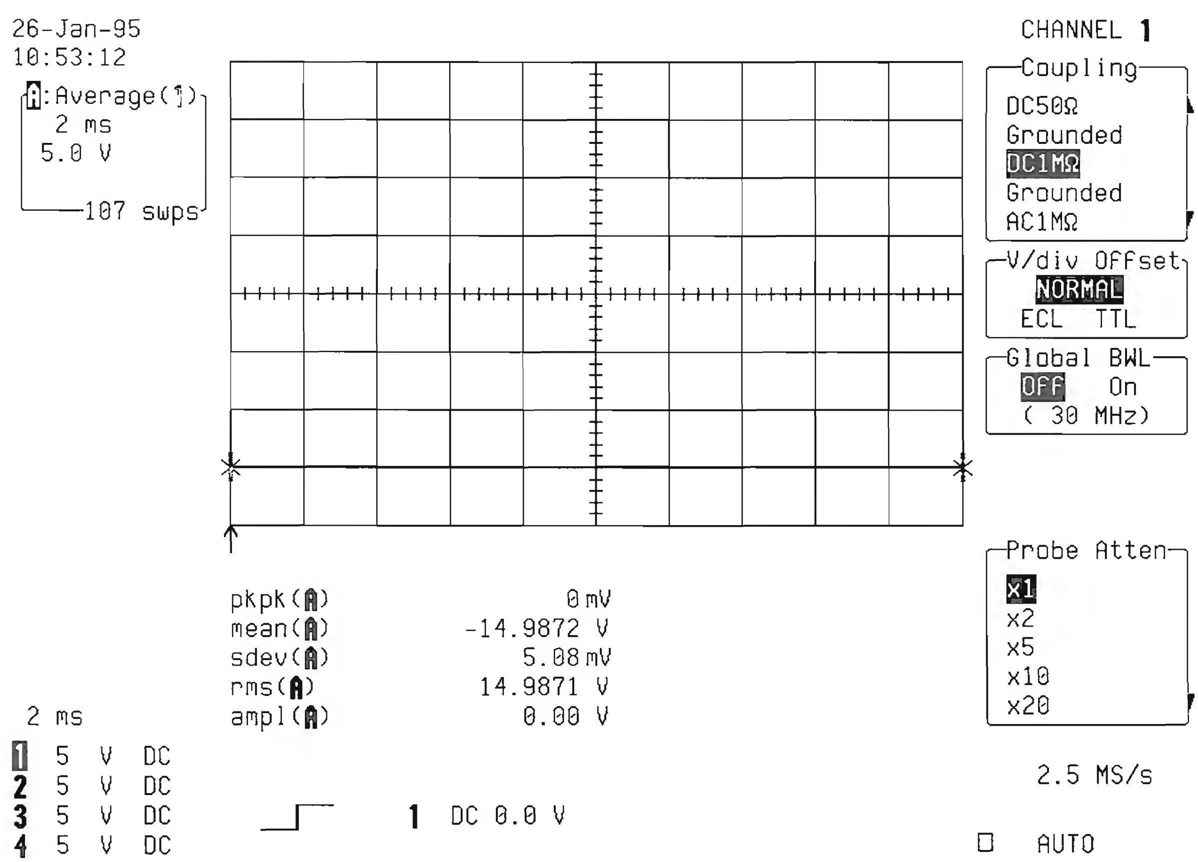
- For the low sensitivities : **2, 5, 10, 20** and **50 mV/div.**, use a **1MΩ 20 dB** attenuator (1/10), see table 5-4.

Range	Attenuator	Conditions of Test			Average Mean Parameter Reading		
Volts/div Control	20 dB	PS Output	9354A/T Input	9354A/T Full scale	Min Value ±X% of FS	Max Value ±X% of FS	± X%
2 mV	Yes	± 60 mV	± 6 mV	16 mV	± 5.2 mV	± 6.8 mV	5%
5 mV	Yes	± 150 mV	± 15 mV	40 mV	± 13.8 mV	± 16.2 mV	3%
10 mV	Yes	± 300 mV	± 30 mV	80 mV	± 28.4 mV	± 31.6 mV	2%
20 mV	Yes	± 600 mV	± 60 mV	160 mV	± 56.8 mV	± 63.2 mV	2%
50 mV	Yes	± 1.5 V	±150 mV	400 mV	± 142 mV	± 158 mV	2%
.1 V	No	± 300 mV	± 300 mV	800 mV	± 284 mV	± 316 mV	2%
.2 V	No	± 600 mV	± 600 mV	1.6 v	± 568 mV	± 632 mV	2%
.5 V	No	± 1.5 V	± 1.5 V	4 V	± 1.42 V	± 1.58 V	2%
1 V	No	± 3 V	± 3 V	8 V	± 2.84 V	± 3.16 V	2%
2 V	No	± 6 V	± 6 V	16 V	± 5.68 V	± 6.32 V	2%
5 V	No	± 15 V	± 15 V	40 V	± 14.2 V	± 15.8 V	2%

Table 5-4 : 1MΩ DC Linearity Readout Accuracy

- For each point, read off the **Mean** parameter voltage, and compare it to the digital readout of the voltage reference.
- The **mean** parameter reading should be within the limits shown in table 5-4.
- Repeat steps 5.7.1.a and 5.7.1.b for Channel 2, Channel 3, and Channel 4 substituting channel controls and input connector.


26-Jan-95
10:51:22
A: Average(1)
2 ms
1.00 V
278 swps
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
pkpk(A) 0.0 mV
mean(A) 3.05933 V
sdev(A) 1.504 mV
rms(A) 3.05927 V
ampl(A) 0 mV
2 ms
1 1 V DC
2 1 V DC
3 1 V DC
4 1 V DC
1 DC 0.00 V
2.5 MS/s
AUTO


26-Jan-95
10:53:12
A: Average(1)
2 ms
5.0 V
107 swps
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
pkpk(A) 0 mV
mean(A) -14.9872 V
sdev(A) 5.08 mV
rms(A) 14.9871 V
ampl(A) 0.00 V
2 ms
1 5 V DC
2 5 V DC
3 5 V DC
4 5 V DC
1 DC 0.0 V
2.5 MS/s
AUTO

5.8 Offset

5.8.1 Description

The maximum allowed offsets depend on the sensitivity as shown in table 5-5 and 5-6, and is tested at DC 1 MΩ, over the full 2 mV to 5 V range.

Specifications

± 120mV: for the ranges 2mV/div., 5 mV/div.
± 1.2 V : for 10 mV/div., 20 mV/div., 50 mV/div., 100 mV/div.
± 24 V : for 200 mV/div., 500 mV/div., 1 V/div., 2 V/div., 5 V/div.

5.8.1.a Negative Offset Control Procedure

Set the DSO as follows :

- Turn on trace : **Channel 1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 1MΩ**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input gain : **5 mV**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Auto**
- Holdoff : **Off**
- Timebase : **2 msec/div.**
- Channel use : **4**
- Record up : **50 K**
- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- For : **1000 sweeps**
- Of : **Channel 1**

- Turn off trace : **Channel 1**
- Cursors/Measure : **Parameters**
- Mode : **Std Voltage**
- Statistics : **off**
- On displayed trace : **A**

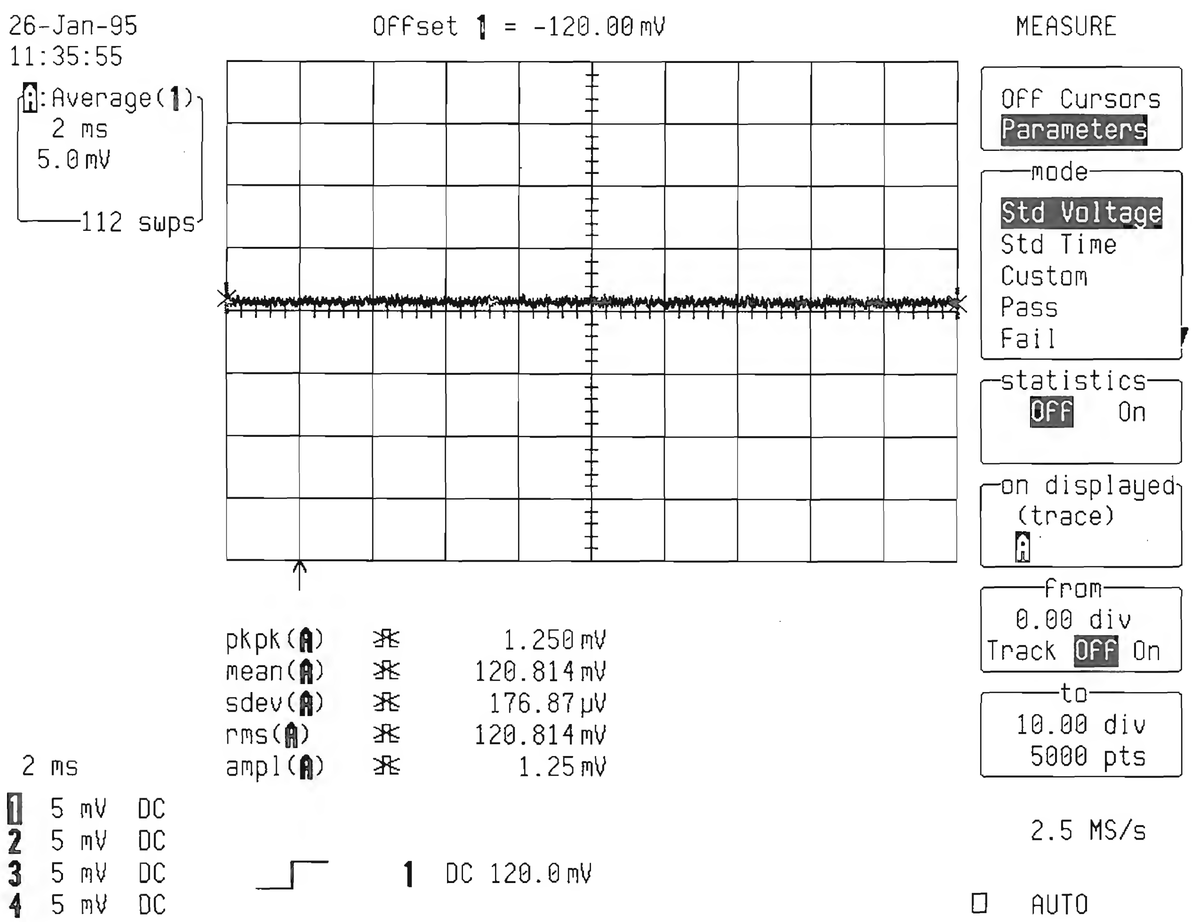
- From the high precision voltage source PS5004, apply to Channel 1 + **120 mV** .
- Using the offset control, move Channel 1 trace through the entire range until the maximum offset value is reached : **- 120 mV**.

- Verify that the displayed trace A : Average (1) is in the screen, near to the center horizontal graticule line.

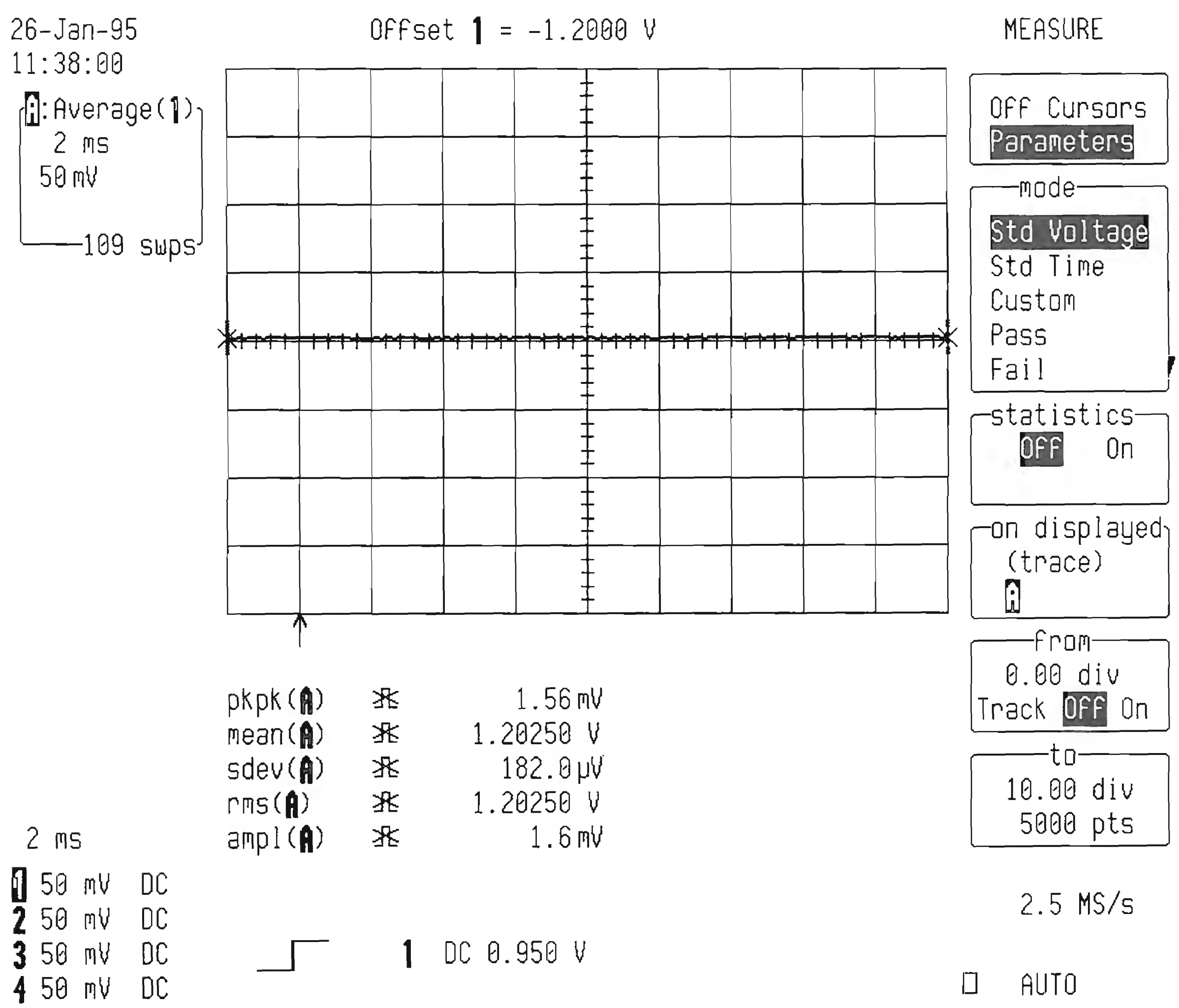
- Press clear sweeps.
- Check after at least 100 sweeps that the mean (A) parameter readout is : **+ 120 mV ± 3 %**.

Range	Conditions of Test		Offset Control	Mean Parameter Reading		
Volts/div Control	PS Output	9354A/T Input	9354A/T Offset	Minimum value, -X %	Maximum Value, +X %	
5 mV	+ 120 m V	+ 120 mV	- 120 mV	+ 116.4 mV	+ 123.6 mV	3%
50 mV	+ 1.2 V	+ 1.2 V	- 1.2 V	+ 1.164 V	+ 1.236 V	3%
5 V	+ 20 V	+ 20 V	- 24 V	+ 18.6 V	+ 21.4V	7%

Table 5-5 : Negative offset control



- Set input gain to **50 mV/div.**, from the high precision voltage source, apply to Channel 1 the following voltage value : **+ 1.2 V**.
- Using the offset control, move the Ch1 trace through the entire range until the following offset value is reached : **- 1.2 V**.
- Verify that the displayed trace A : Average (1) is in the screen (near to the center horizontal graticule line) .
- Press clear sweeps
- Check after at least 100 sweeps that the mean (A) parameter readout is : **+ 1.2 V ± 3 %** (see table 5-5).



- Set input gain to **5 V/div.**, from the high precision voltage source, apply to Channel 1 : + **20 V** (maximum from PS5004).
- Using the offset control, move the Ch1 trace through the entire range until the maximum offset value is reached : **- 24 V**.
- Verify that the displayed trace A : Average (1) is in the screen
- Press clear sweeps
- Check after at least 100 sweeps that the mean (A) parameter readout is : **+ 20 V ± 7 %** (see table 5-5).
- Repeat step 5.8.1.a for Channel 2, Channel 3 and Channel 4 substituting channel control and input connector.

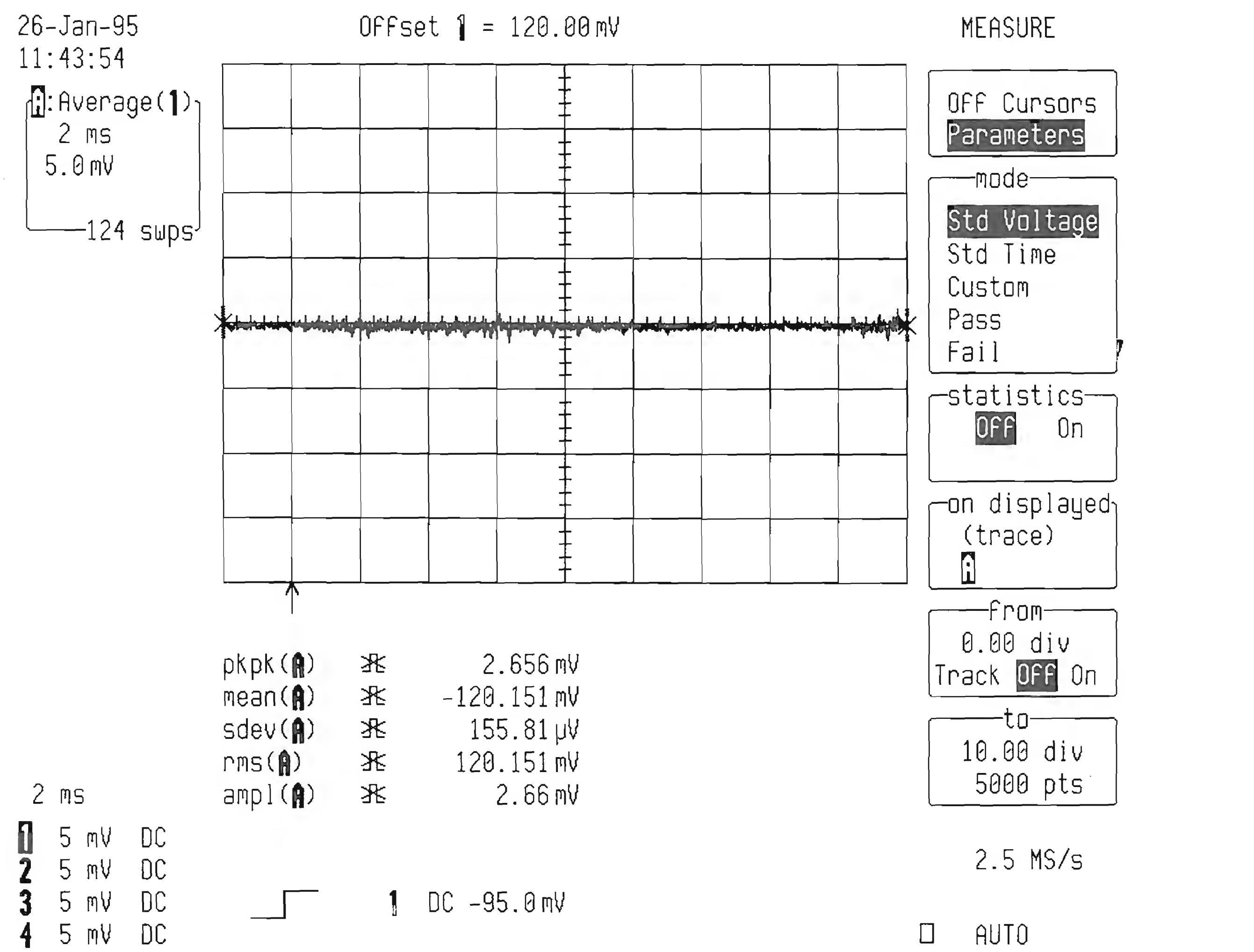
5.8.1.b Positive Offset Control Procedure

Set the DSO as in 5.8.1.a:

- Channel 1 input gain : **5 mV**
- From the high precision voltage source PS5004, apply to Channel 1 : **- 120 mV** .
- Using the offset control, move Channel 1 trace through the entire range until the maximum offset value is reached : **+ 120 mV**.
- Verify that the displayed trace A : Average (1) is in the screen, near to the center horizontal graticule line.
- Press clear sweeps.
- Check after at least 100 sweeps that the mean (A) parameter readout is : **- 120 mV ± 3 %**.

Range	Conditions of Test		Offset Control	Mean Parameter Reading		
Volts/div Control	PS Output	9354A/T Input	9354A/T Offset	Minimum value, -X %	Maximum Value, +X %	
5 mV	- 120 mV	- 120 mV	+ 120 mV	- 116.4 mV	- 123.6 mV	3%
50 mV	- 1.2 V	- 1.2 V	+ 1.2 V	- 1.164 V	- 1.236 V	3%
5 V	- 20 V	- 20 V	+ 24 V	- 18.6 V	- 21.4V	7%

Table 5-6 : Positive offset control



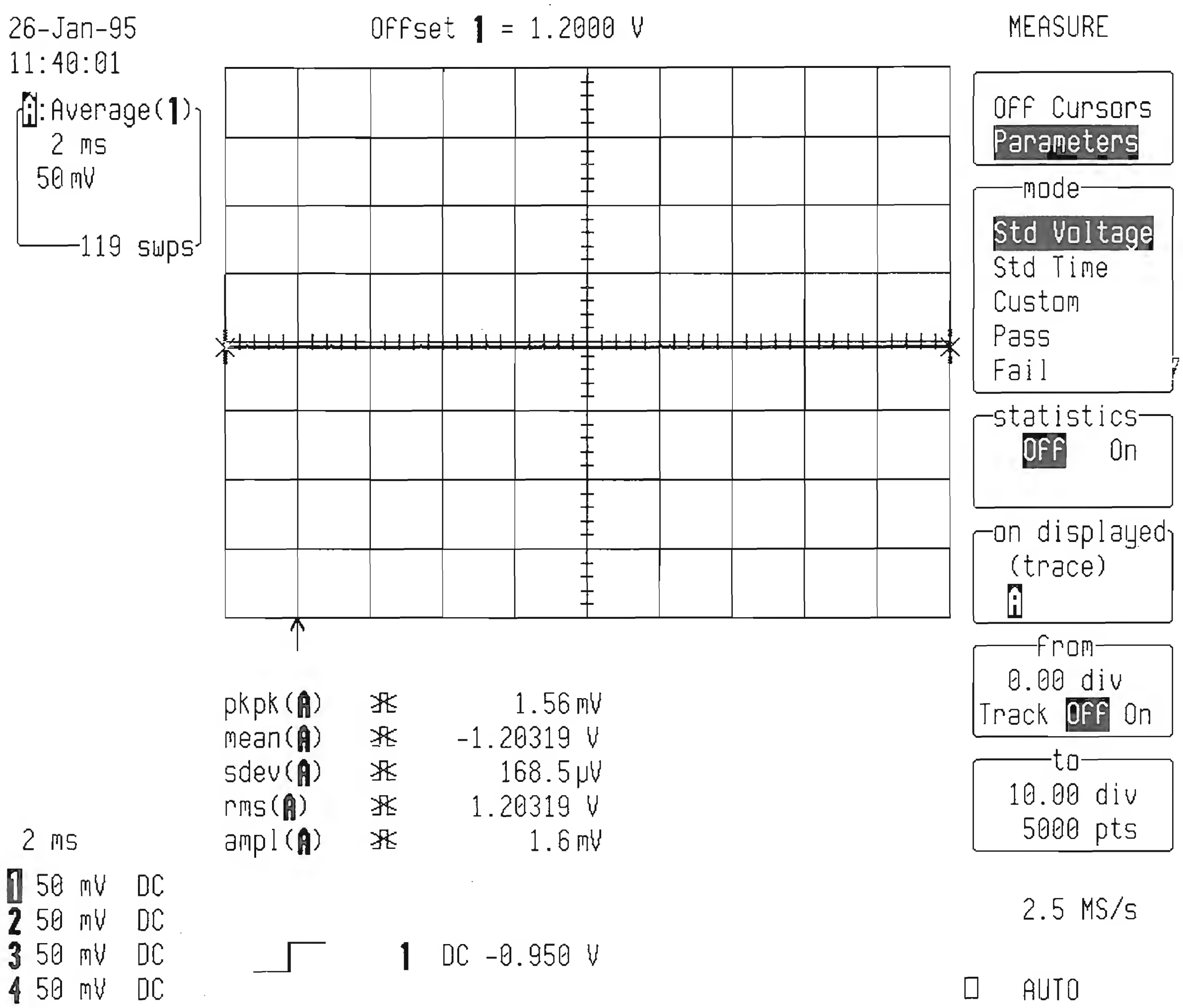
- Set input gain to **50 mV/div.**, from the high precision voltage source, apply to Channel 1 the following voltage value : **+ 1.2 V**.

- Using the offset control, move the Ch1 trace through the entire range until the following offset value is reached : **- 1.2 V**.

- Verify that the displayed trace A : Average (1) is in the screen (near to the center horizontal graticule line) .

- Press clear sweeps

- Check after at least 100 sweeps that the mean (A) parameter readout is : + **1.2 V** ±**3 %** (see table 5-6).



- Set input gain to **5 V/div.**, from the high precision voltage source, apply to Channel 1 - **20 V** (maximum from PS5004).

- Using the offset control, move the Ch1 trace through the entire range until the maximum offset value is reached : + **24 V**.

- Verify that the displayed trace A : Average (1) is in the screen.

- Press clear sweeps

- Check after at least 100 sweeps that the mean (A) parameter readout is :
- 20 V ± **7 %** (see table 5-6).

- Repeat step 5.8.1.b for Channel 2, Channel 3 and Channel 4 substituting channel control and input connector.

5.9 Bandwidth

5.9.1 Description

The purpose of this test is to ensure that the entire system has a bandwidth of at least 500 MHz at 200 mV/div. An external source is used as the reference to provide a signal where amplitude and frequency are well controlled. A serious measurement of the bandwidth requires the use of a source whose amplitude does not change with frequency. The LeCroy calibration software corrects for the measured amplitude variation of the generator used. Generators can have errors of - 2 dB above 500 MHz. The non flatness of the generator should be taken into consideration.

Specifications

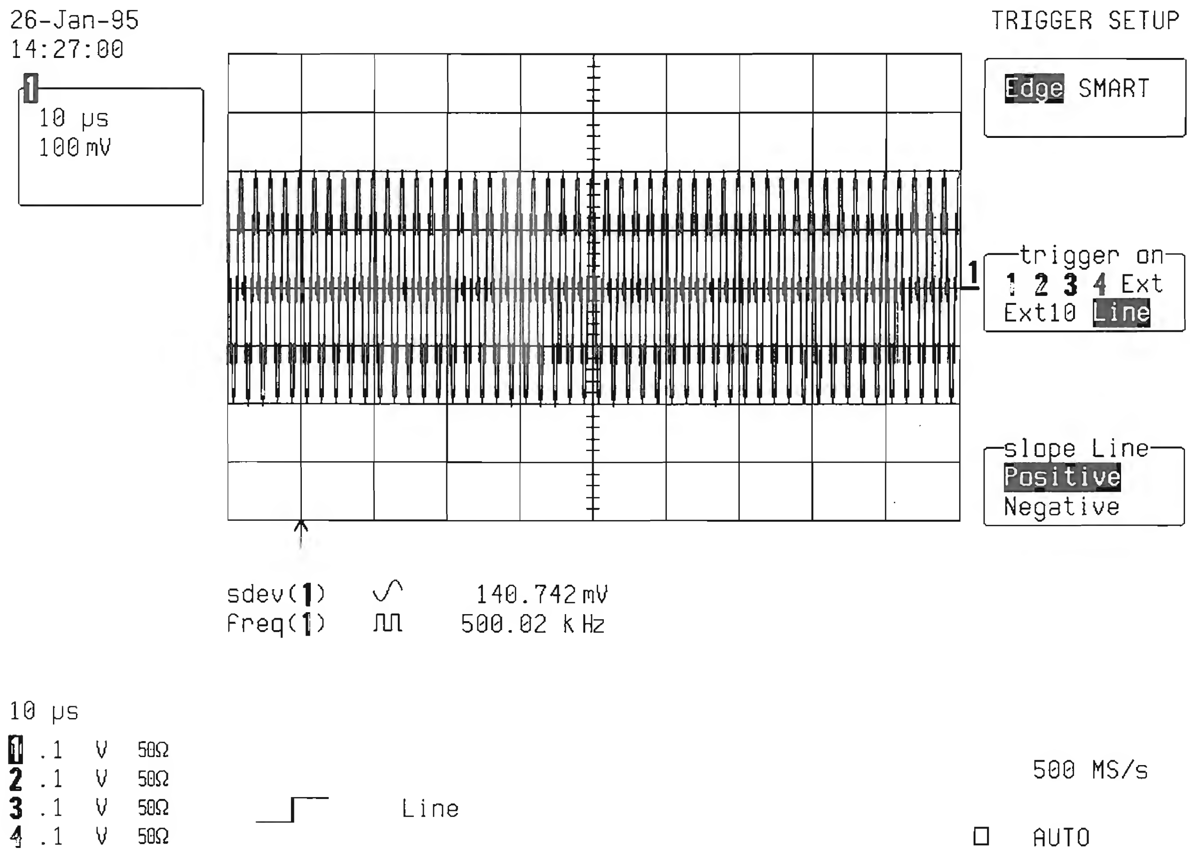
DC to at least 500 MHz (- 3 dB) at 200 mV/div. and above.
DC to at least 400 MHz at 100 mV/div.
DC to at least 350 MHz below 100 mV/div.

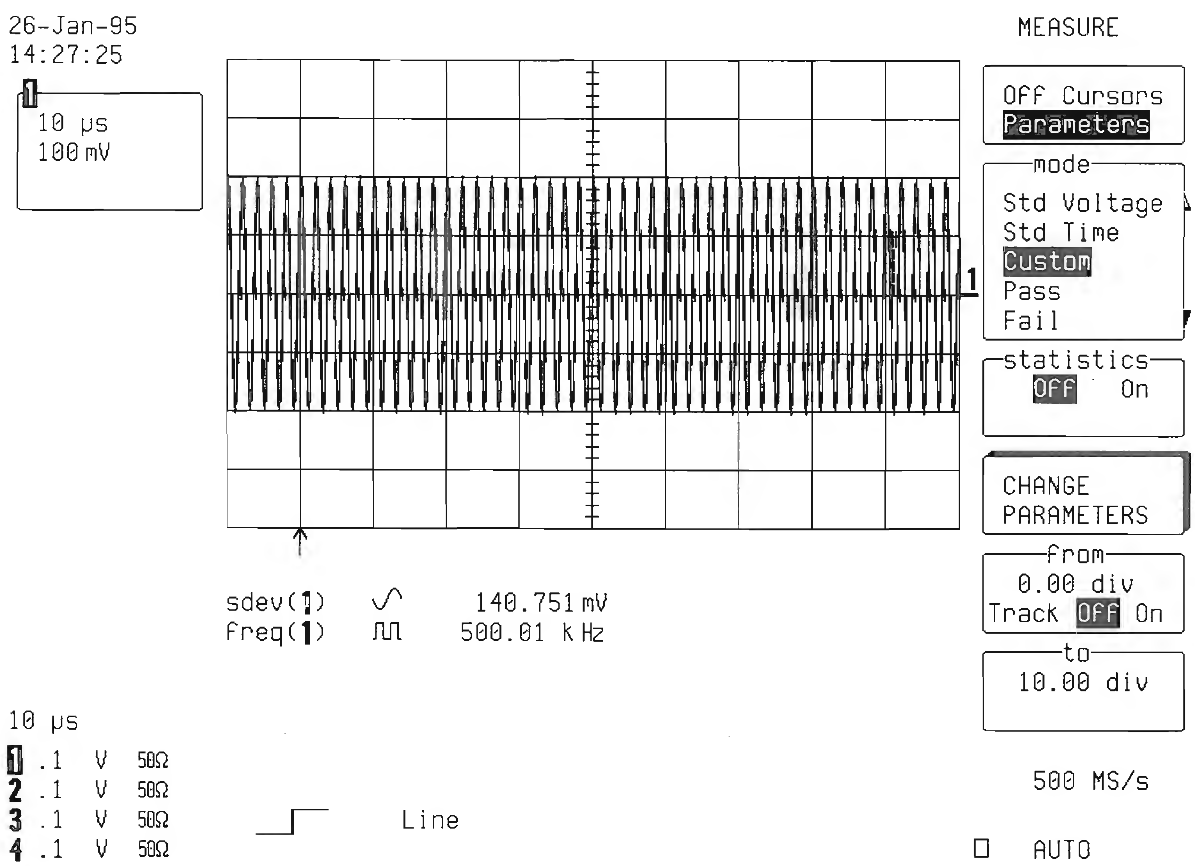
5.9.1.a DC 50 Ω

Procedure

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input gain : **100 mV/div.**
- Offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Line**
- Slope Line : **Pos**
- Mode : **Norm or Auto**
- Timebase : **10 µsec/div.**
- Channel use : **4**
- Record up : **50 K**
- Press Cursors/Measure: **Parameters**
- Mode : **Custom**
- Statistics : **off**
- Change parameters : **Measure**
- On line 1 : **sdev of 1**
- On line 2 : **freq of 1**

- Connect a leveled sine wave generator to Channel 1 (i.e. Marconi 2030), set the frequency to **500 KHz**, adjust the generator output amplitude to get on DSO : **sdev(1) = 140 mV**.

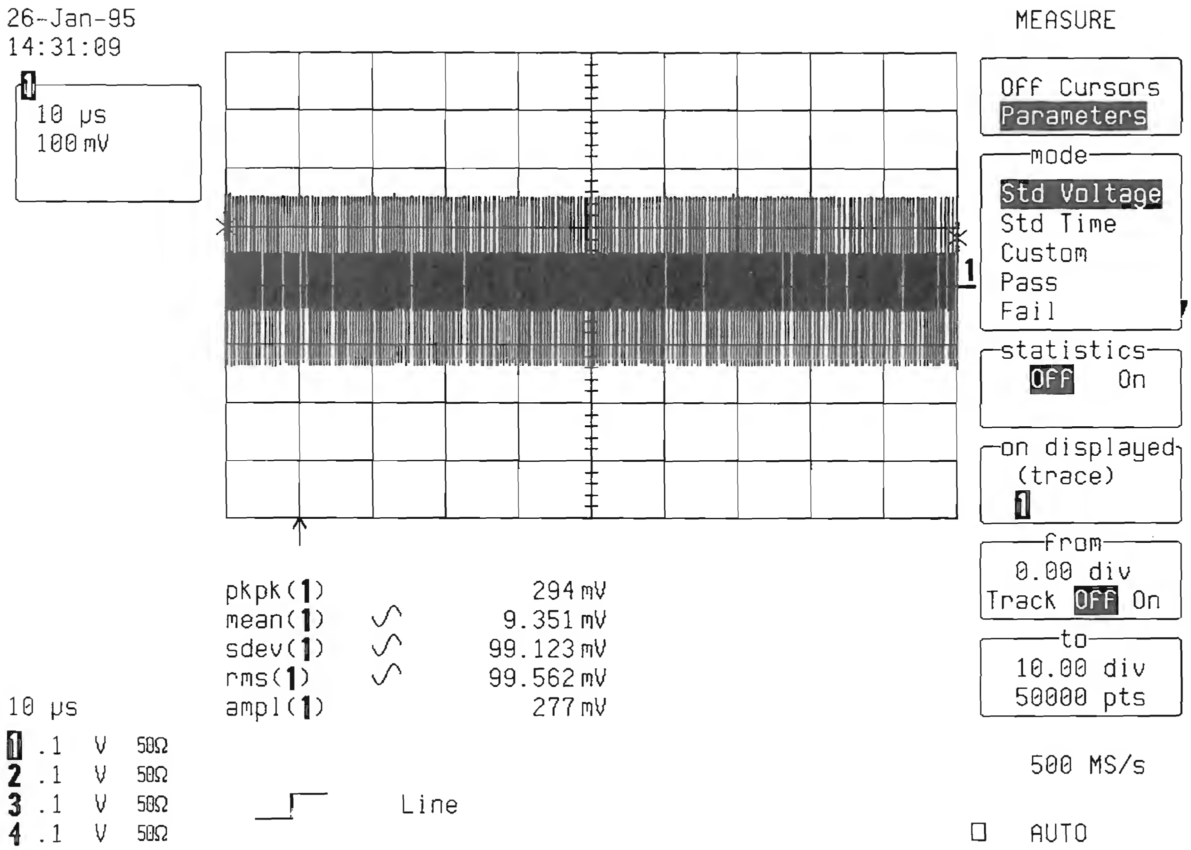

26-Jan-95
14:27:00
1
10 µs
100 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
slope Line
Positive
Negative
sdev(1) 140.742 mV
freq(1) 500.02 kHz
10 µs
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
Line
500 MS/s
AUTO


26-Jan-95
14:27:25
1
10 µs
100 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
CHANGE
PARAMETERS
from
0.00 div
Track Off On
to
10.00 div
sdev(1) 140.751 mV
freq(1) 500.01 kHz
10 µs
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
Line
500 MS/s
AUTO

- Increase the generator frequency in multi **50 MHz** steps until the sine wave amplitude is 70% of the initial amplitude at 500 KHz .

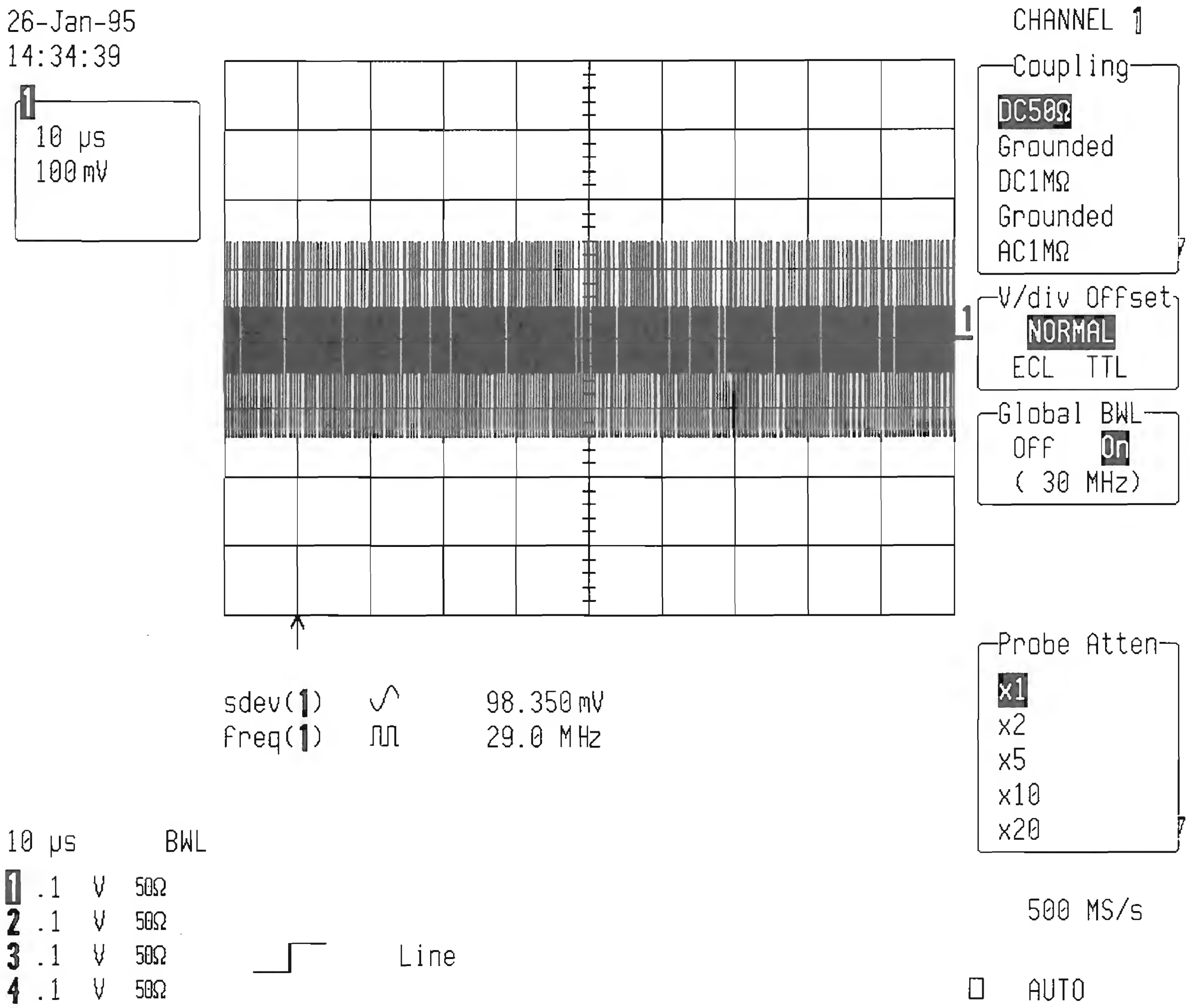
- At each 50 MHz step, check that **sdev(1) > 98 mV**

- When **sdev(1) = 98 mV (3 dB point)** the frequency of the generator must be at least **400 MHz**.



- Select Coupling and **Global BWL : On** (bandwidth limiter on)

- Check that the frequency at the 3 dB point (**sdev(1) = 98 mV**) is typically **30 MHz** . (between 22 MHz and 43 MHz).

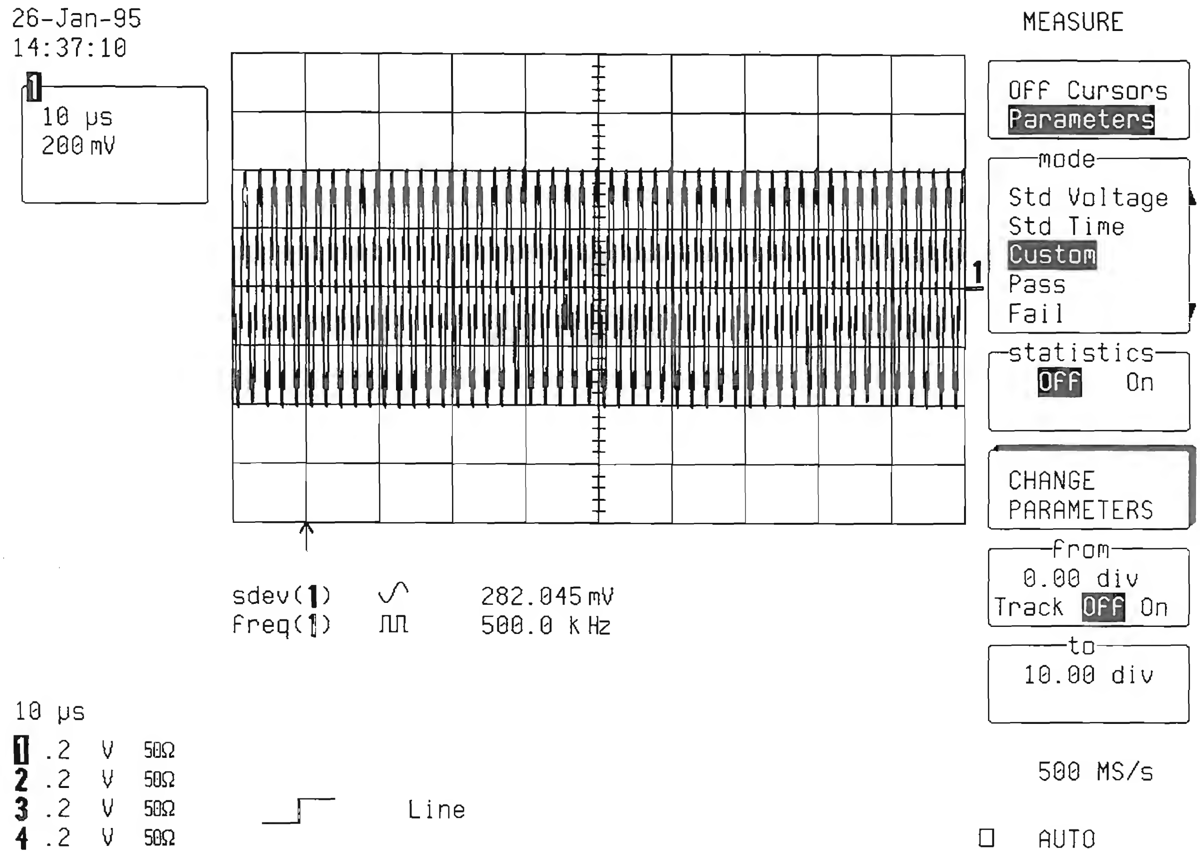


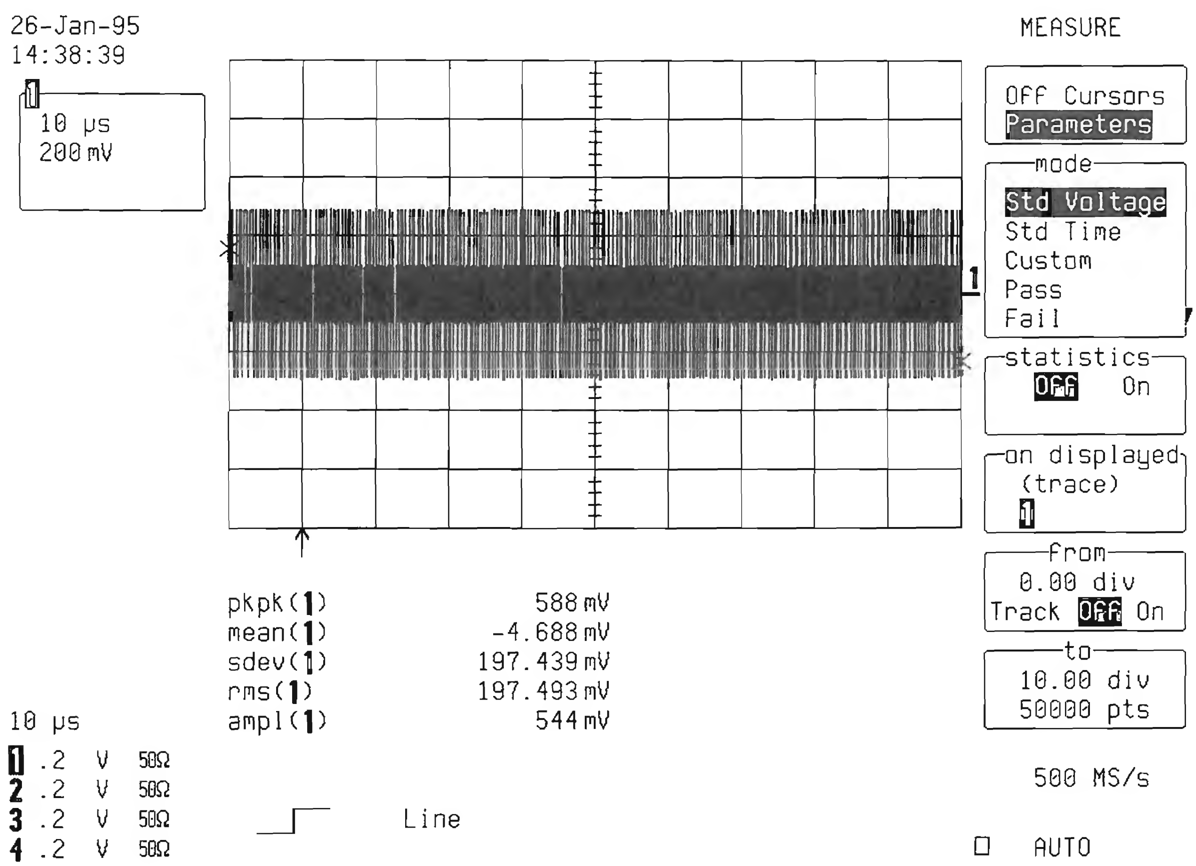
- Set DSO Input gain : **200 mV/div.**
- Select Coupling and **Global BWL : Off** (bandwidth limiter off)
- Set sine wave generator frequency to **500 KHz**, adjust the generator output amplitude to get on DSO : **sdev(1) = 282 mV**.

- Increase the generator frequency in multi **50 MHz** steps until the sine wave amplitude is 70% of the initial amplitude at 500 KHz .

- At each 50 MHz step, check that **sdev(1) > 198 mV**

- When **sdev(1) = 198 mV (3 dB point)** the frequency of the generator must be at least **500 MHz**.


26-Jan-95
14:37:10
1
10 µs
200 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
CHANGE
PARAMETERS
from
0.00 div
Track Off On
to
10.00 div
sdev(1) 282.045 mV
freq(1) 500.0 kHz
10 µs
1 .2 V 50Ω
2 .2 V 50Ω
3 .2 V 50Ω
4 .2 V 50Ω
Line
500 MS/s
AUTO

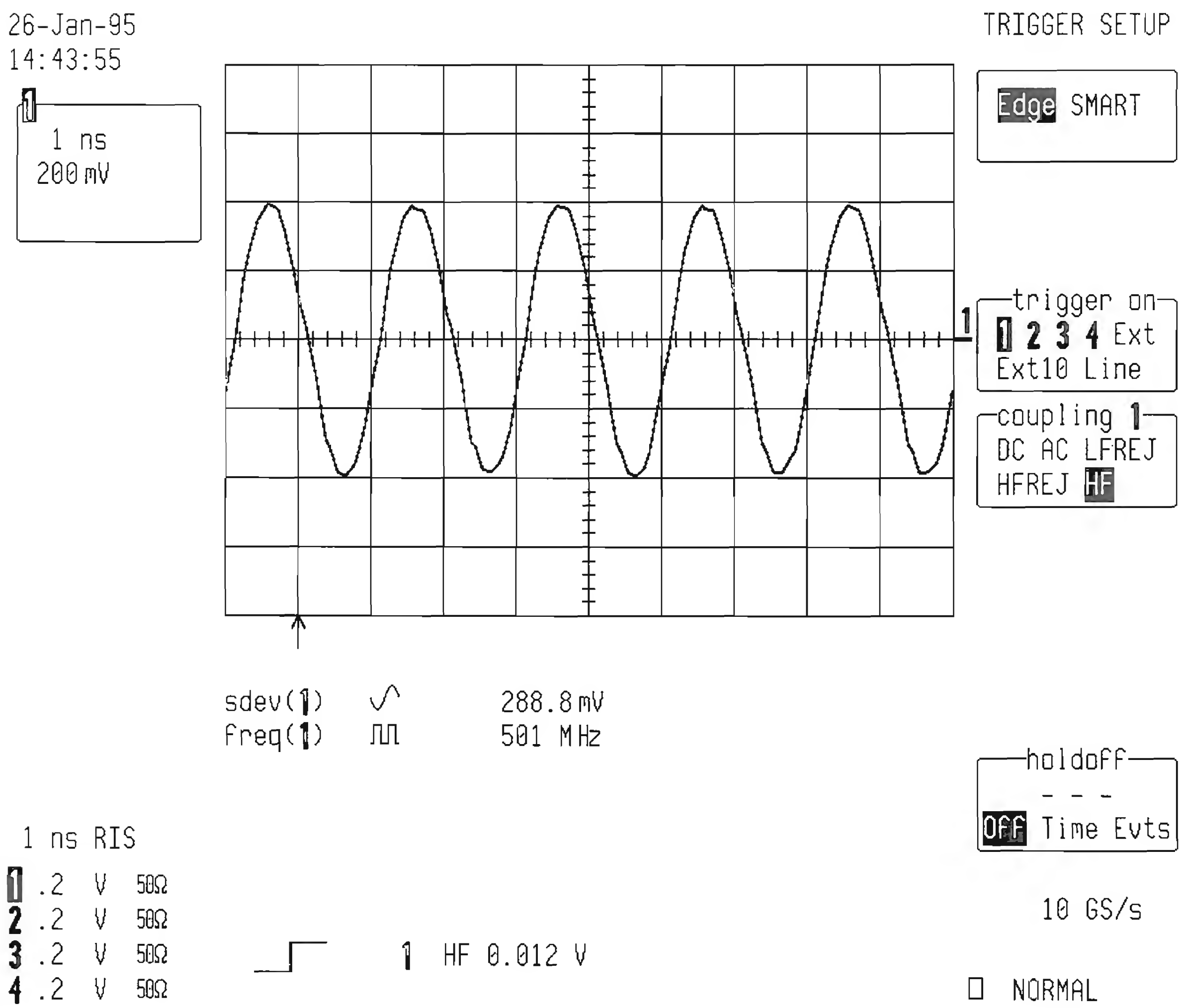

26-Jan-95
14:38:39
1
10 µs
200 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
on displayed
(trace)
1
from
0.00 div
Track Off On
to
10.00 div
50000 pts
pkpk(1) 588 mV
mean(1) -4.688 mV
sdev(1) 197.439 mV
rms(1) 197.493 mV
ampl(1) 544 mV
10 µs
1 .2 V 50Ω
2 .2 V 50Ω
3 .2 V 50Ω
4 .2 V 50Ω
Line
500 MS/s
AUTO

5.9.1.a.1 Trigger Bandwidth

- Set Trigger on : **1**
- Coupling 1 : **HF**
- Mode : **Norm**
- Timebase : **1 nsec/div.**

- Set sine wave generator frequency to **501 MHz**

- Change Trigger level, until the scope triggers on Channel 1.



- Check : The scope must keep triggering in a stable way, a smooth 501 MHz sine wave must be visible on the screen.

- Repeat step 5.9.1.a and 5.9.1.a.1 for Channel 2, Channel 3 and Channel 4, substituting channel control and input connector.

5.9.1.b DC 1 MΩ

The purpose of this test is to ensure that the entire 9354A/T system has a bandwidth of at least **250 MHz at probe tip**.

Set up a Tektronix SG503 leveled sine wave generator or equivalent.

- Terminate the output of the SG503 via a **50Ω feed through** and connect it to the channel 1 input through a **10X-probe** using a probe tip BNC Jack adapter.
  Make sure the probe compensation is perfectly adjusted at low frequency.

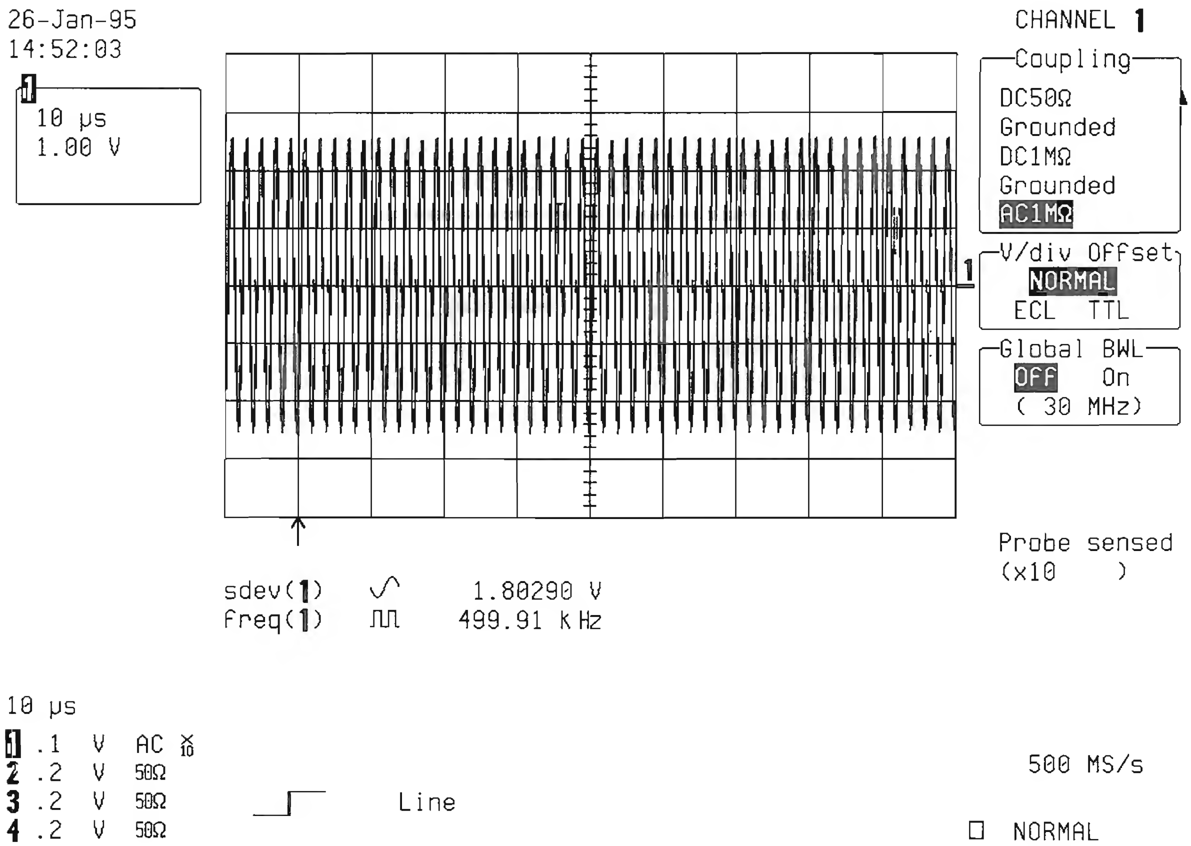
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **AC 1MΩ**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X10**
- Input gain : **1 V/div.**
- Offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Line**
- Slope Line : **Pos**
- Mode : **Norm**
- Timebase : **10 µsec/div.**
- Channel use : **4**
- Record up : **50 K**
- Press Cursors/Measure: **Parameters**
- Mode : **Custom**
- Statistics : **off**
- Change parameters : **Measure**
- On line 1 : **sdev of 1**
- On line 2 : **freq of 1**

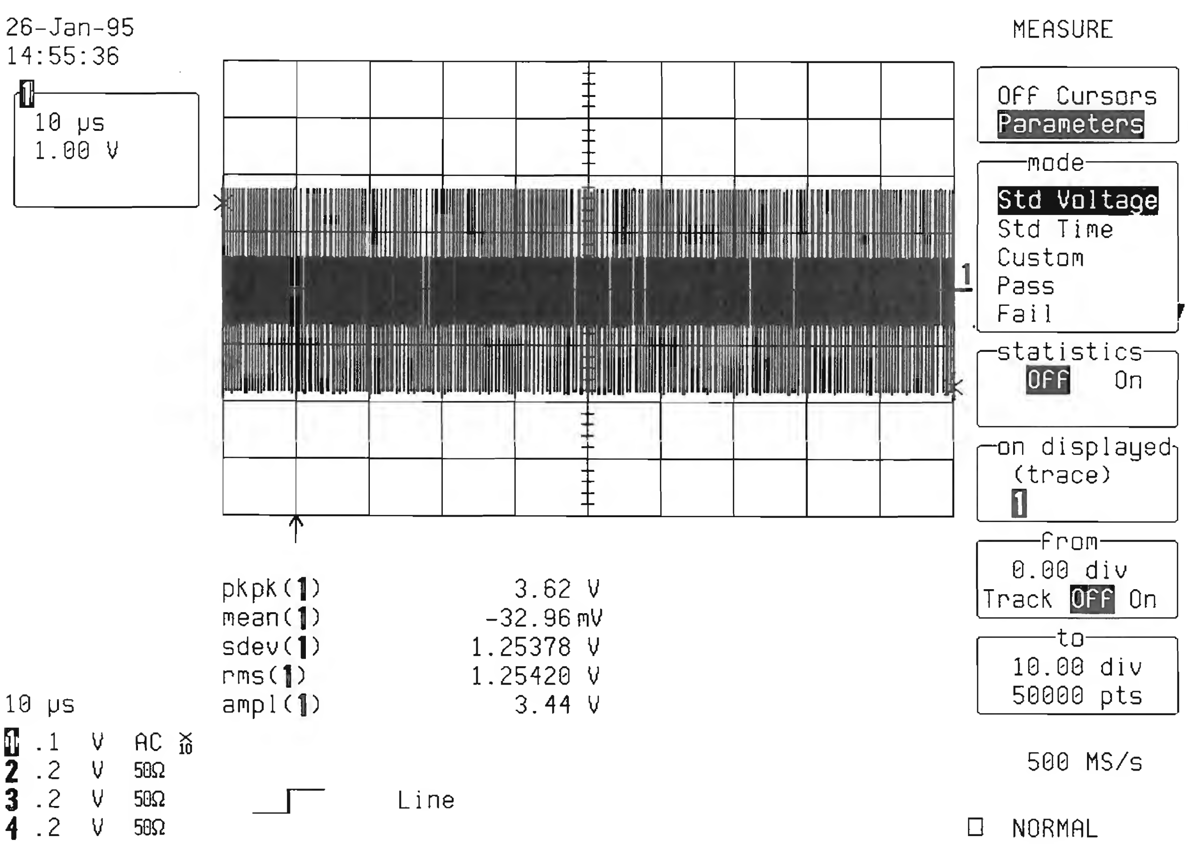
- Set sine wave generator frequency to **500 KHz**, adjust the generator output amplitude to get on DSO : **sdev(1) = 1.8 V**.

- Increase the generator frequency in multi **MHz** steps until the sine wave amplitude is 70% of the initial amplitude at 500 KHz .

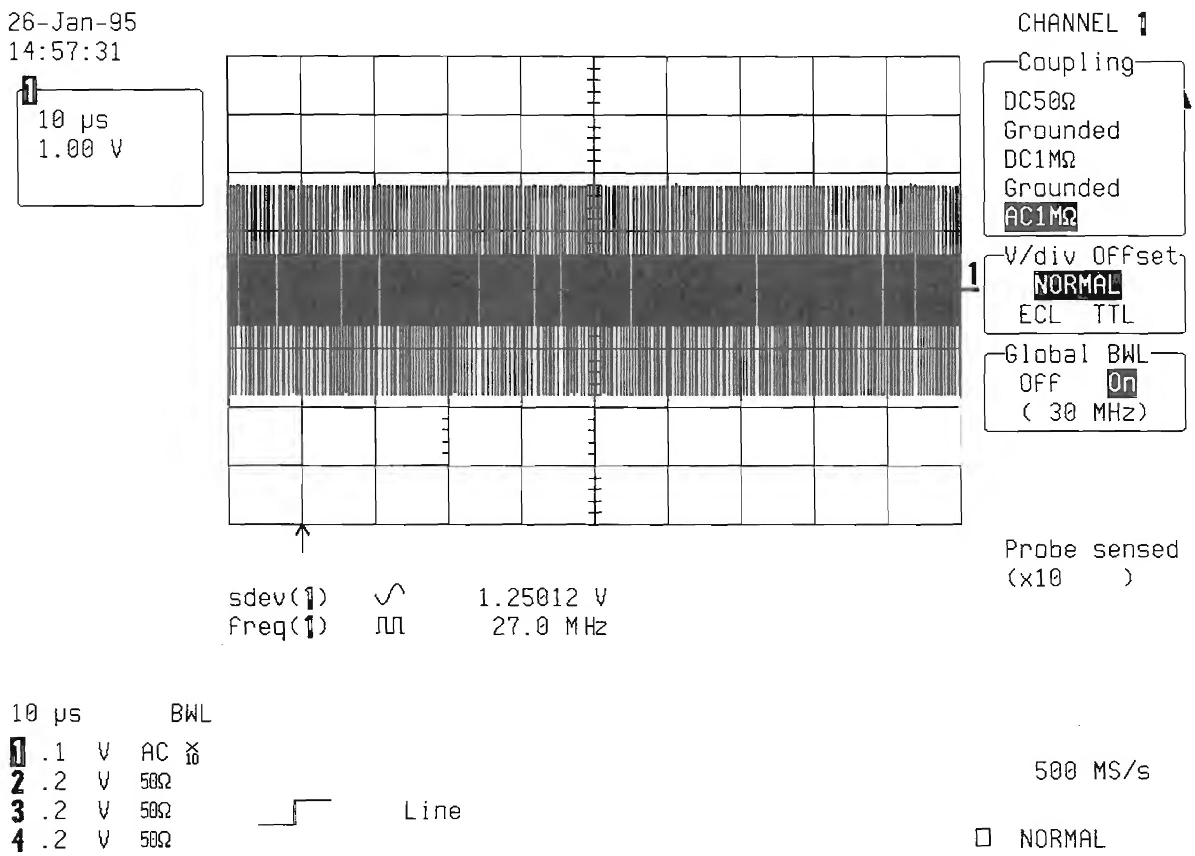
- At each frequency step, check that **sdev(1) > 1.25 V**

- When **sdev(1) = 1.25 V (3 dB point)** the frequency of the generator must be at least **250 MHz**.


26-Jan-95
14:52:03
10 µs
1.00 V
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe sensed
(x10)
sdev(1) 1.80290 V
freq(1) 499.91 kHz
10 µs
1 .1 V AC x10
2 .2 V 50Ω
3 .2 V 50Ω
4 .2 V 50Ω
Line
500 MS/s
NORMAL


26-Jan-95
14:55:36
10 µs
1.00 V
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
on displayed
(trace)
1
from
0.00 div
Track Off On
to
10.00 div
50000 pts
pkpk(1) 3.62 V
mean(1) -32.96 mV
sdev(1) 1.25378 V
rms(1) 1.25420 V
ampl(1) 3.44 V
10 µs
1 .1 V AC x10
2 .2 V 50Ω
3 .2 V 50Ω
4 .2 V 50Ω
Line
500 MS/s
NORMAL

- Set the bandwidth limiter on :
  - Select Coupling and **Global BWL : On**
  - Check that the frequency at the 3 dB point is typically **30 MHz** .
    (between 22 MHz and 43 MHz).



- Repeat step 5.9.1.b for Channel 2, Channel 3 and Channel 4 substituting channel control and input connector.

5.10 Trigger Level

5.10.1 Description

The trigger capabilities are tested for several cases of the standard edge trigger :

- Channel (internal), and External Trigger sources
- Three DC levels : - 3, 0, - 3 major screen divisions
- DC coupling
- Positive and negative slopes

5.10.2 Channel (internal)

The horizontal and vertical errors for a trigger at 0 v threshold are determined by comparing the crossing point of the same sine wave at two different amplitudes.

- Setup any sine wave generator capable of generating sine waves of **1 KHz, 4V pkpk**.
- Connect the generator output to Channel 1

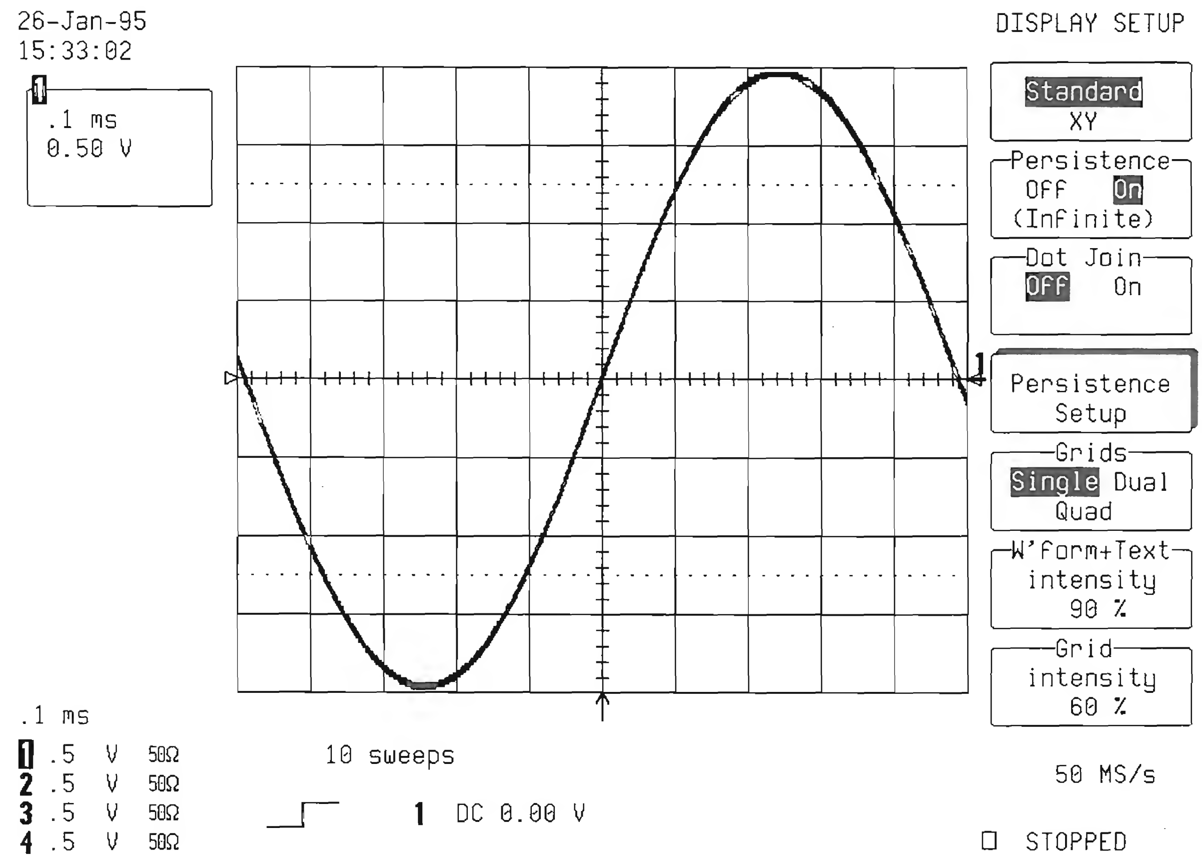
- Turn on trace : **Ch1**
- Input Coupling Ch 1 : **DC 50 Ω**
- V/div. offset : **Normal**
- Input gain : **.5 V/div.**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Set Trigger level : **DC 0.0 mV**
- Mode : **Single**
- Pre-Trigger Delay : **50 %**
- Timebase : **.1 msec/div.**
- Channel Use : **4**
- Record up to : **50 K samples**

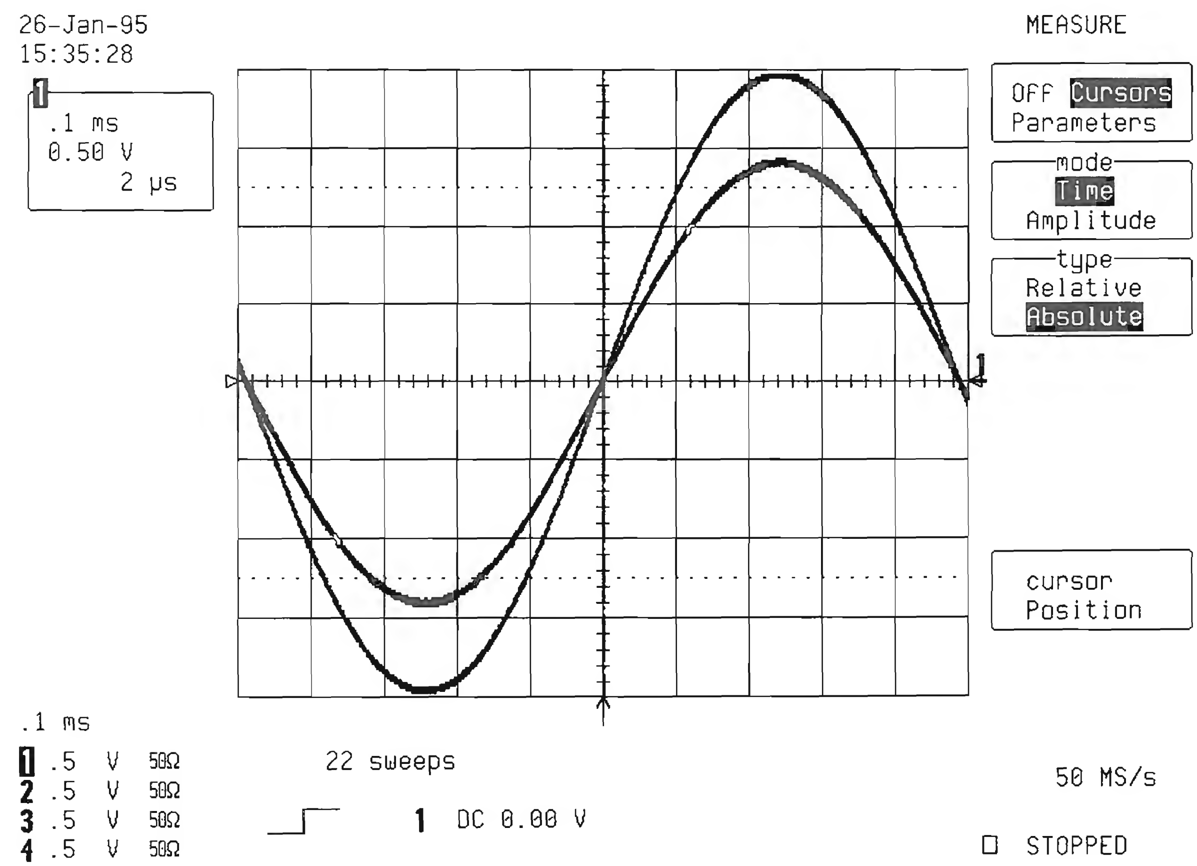
- Adjust the sine wave generator's output amplitude to get **8 divisions peak to peak**, corresponding to a **4 V** amplitude.
- It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.

- Display setup : **Dot join Off**
- Set **Persistence On**, and acquire few sweeps in Single Trigger mode.
- Connect a **3 dB attenuator**, and acquire few more sweeps in Single mode.

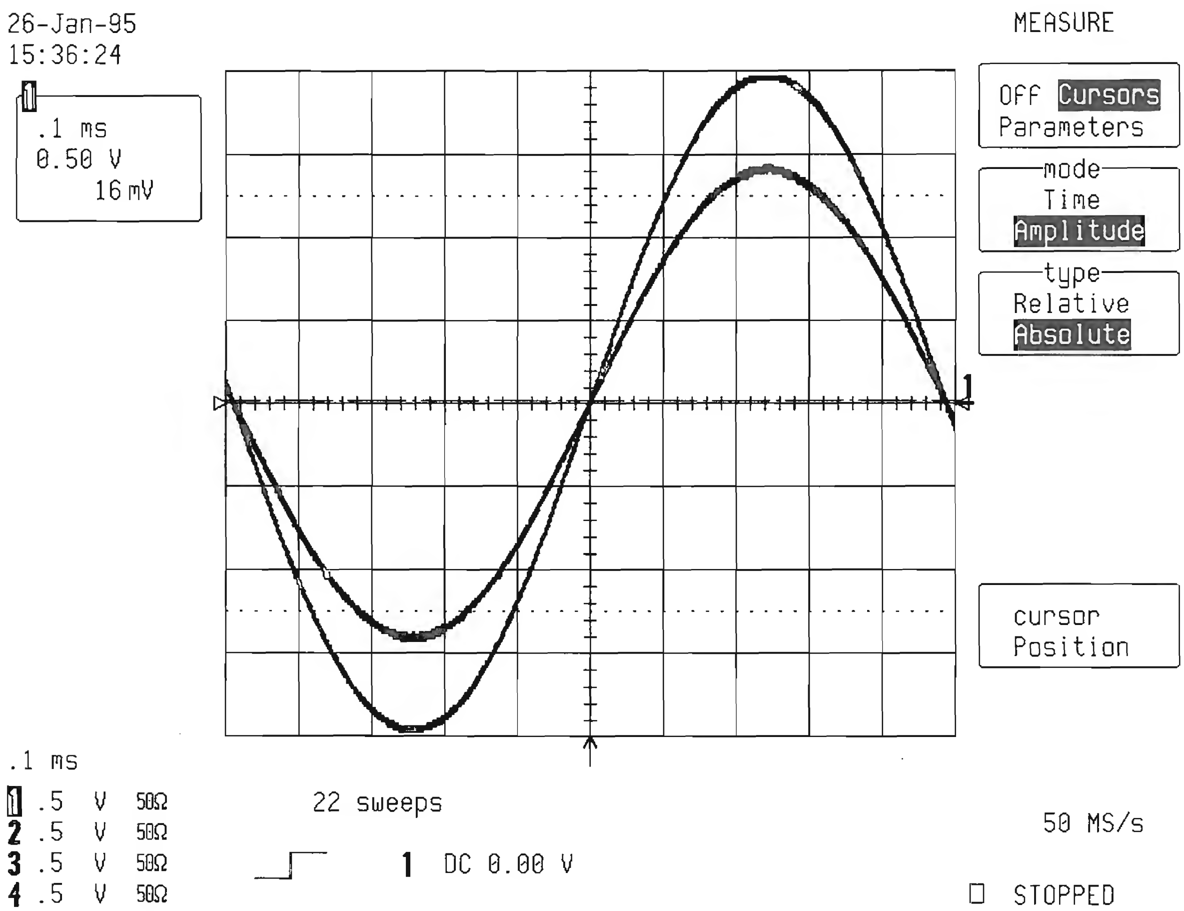
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.

- Check that the **time** difference obtained between the marker and the trigger is within **± 20 μ sec.** The time readout is below 0.50 V in the icon **1,** at top left.


26-Jan-95
15:33:02
1
.1 ms
0.50 V
DISPLAY SETUP
Standard
XY
Persistence
Off On
(Infinite)
Dot Join
Off On
Persistence
Setup
Grids
Single Dual
Quad
W'form+Text
intensity
90 %
Grid
intensity
60 %
.1 ms
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
10 sweeps
1 DC 0.00 V
50 MS/s
STOPPED


26-Jan-95
15:35:28
1
.1 ms
0.50 V
2 μs
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
22 sweeps
1 DC 0.00 V
50 MS/s
STOPPED

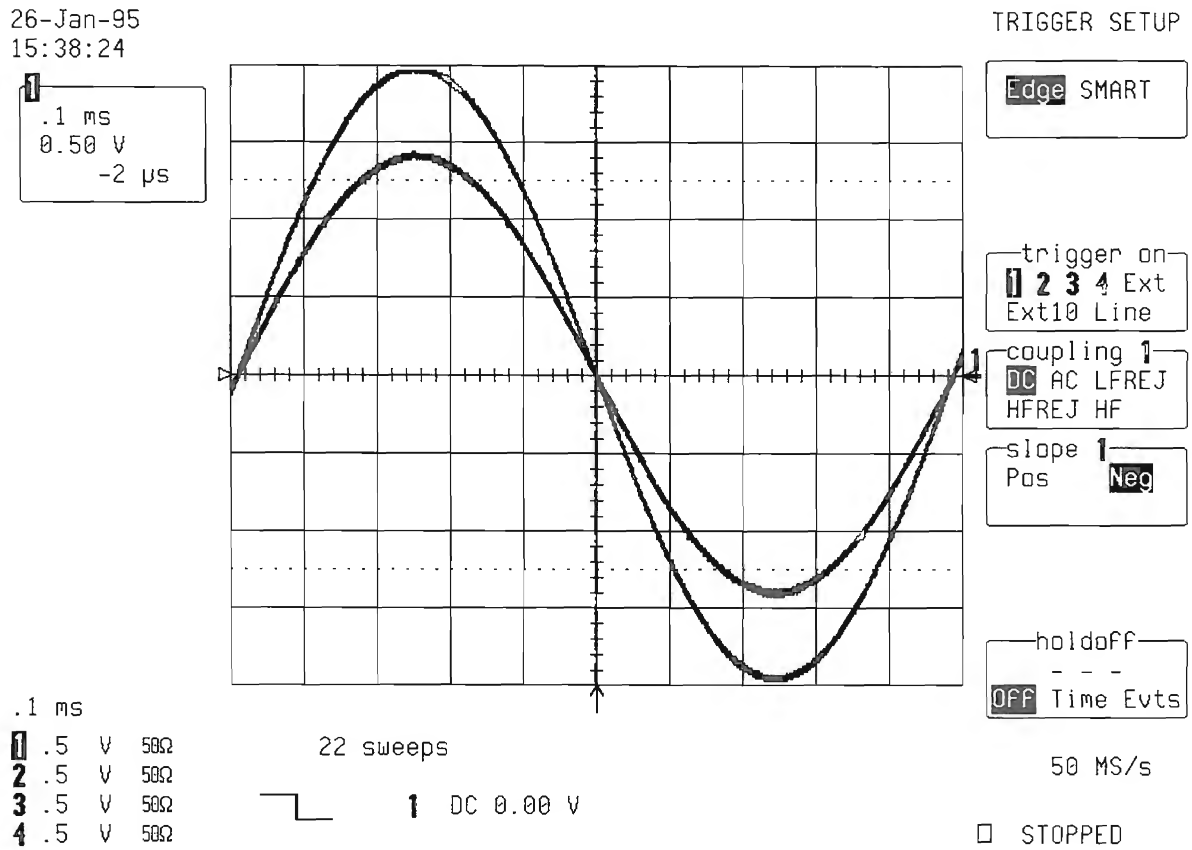
- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.
- Check that the **voltage** difference obtained between the marker and the trigger level is within ± **200 mV.** The level readout is below 0.50 V in the icon **1**, at top left.

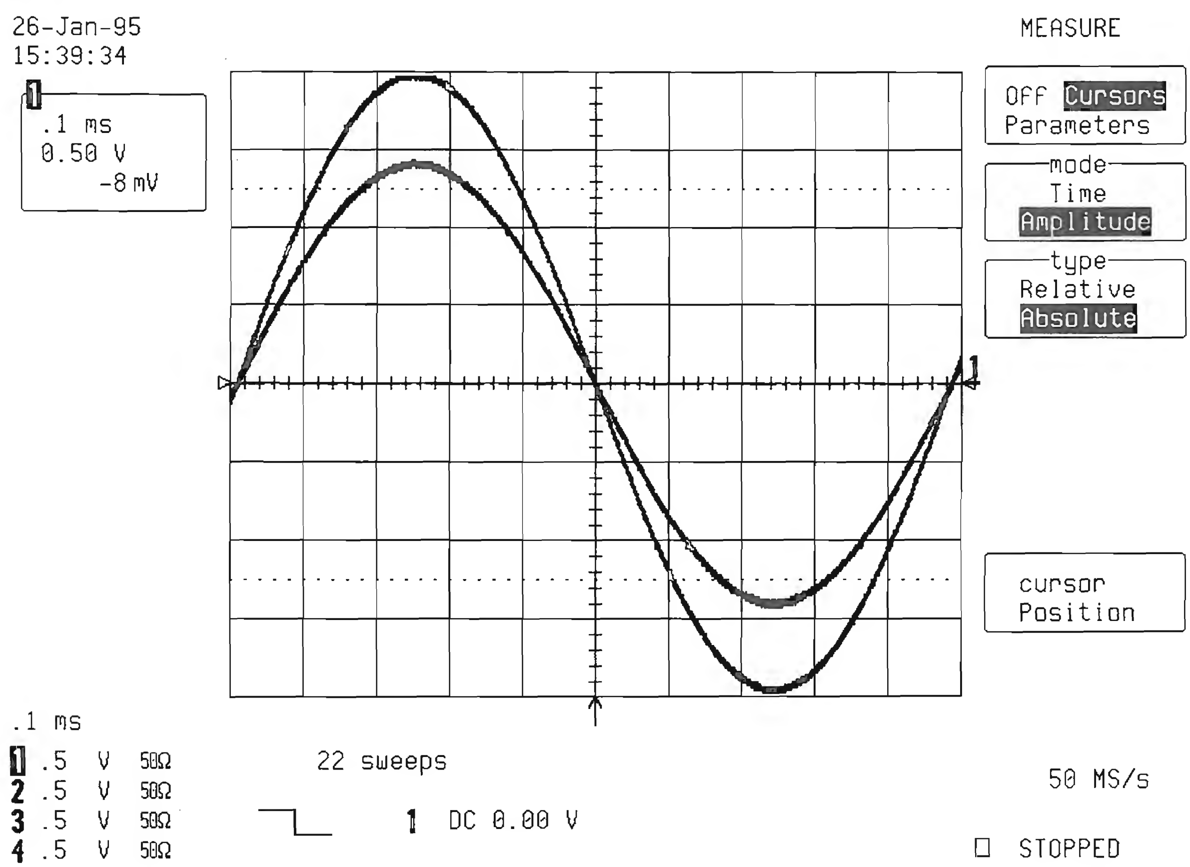


- Set Trigger Slope 1 : **Neg**

- Disconnect the **3 dB attenuator** from the BNC input
- Acquire few sweeps in Single Trigger mode.
- Connect the **3 dB attenuator**, and acquire few more sweeps in Single mode.
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.
- Check that the **time** difference obtained between the marker and the trigger is within ± **20 μ sec.** The time readout is below 0.50 V in the icon **1**, at top left.

- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.
- Check that the **voltage** difference obtained between the marker and the trigger level is within ± **200 mV.** The level readout is below 0.50 V in the icon **1**, at top left.


26-Jan-95
15:38:24
.1 ms
0.50 V
-2 µs
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
coupling 1
DC AC LFREJ
HFREJ HF
slope 1
Pos Neg
holdoff
- - -
Off Time Evts
.1 ms
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
22 sweeps
1 DC 0.00 V
50 MS/s
STOPPED


26-Jan-95
15:39:34
.1 ms
0.50 V
-8 mV
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
22 sweeps
1 DC 0.00 V
50 MS/s
STOPPED

- Set Trigger level : **DC + 1.5 V**
- Disconnect the **3 dB attenuator** from the BNC input
- Set Trigger Slope 1 : **Pos**

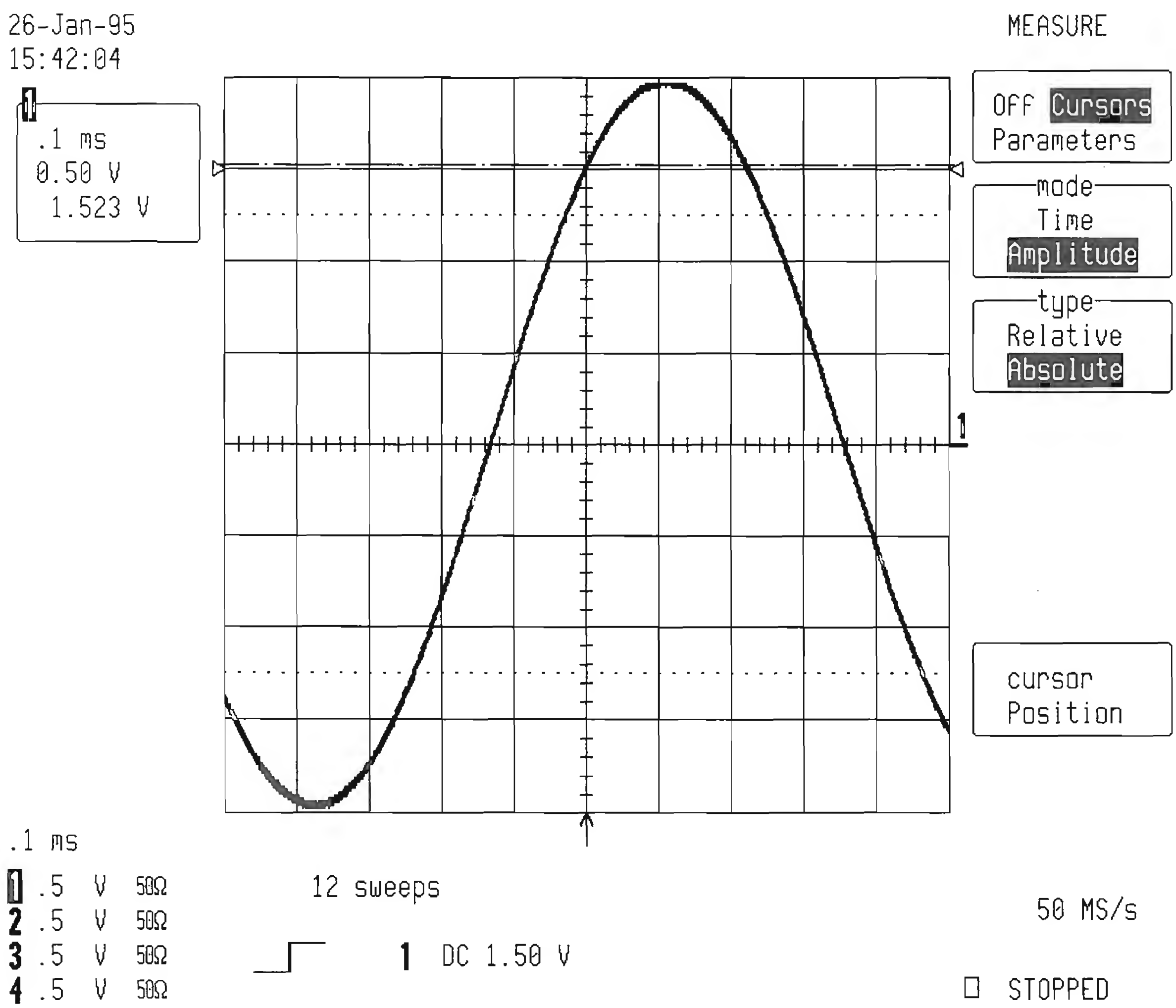
- Acquire few sweeps in Single Trigger mode.

- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.

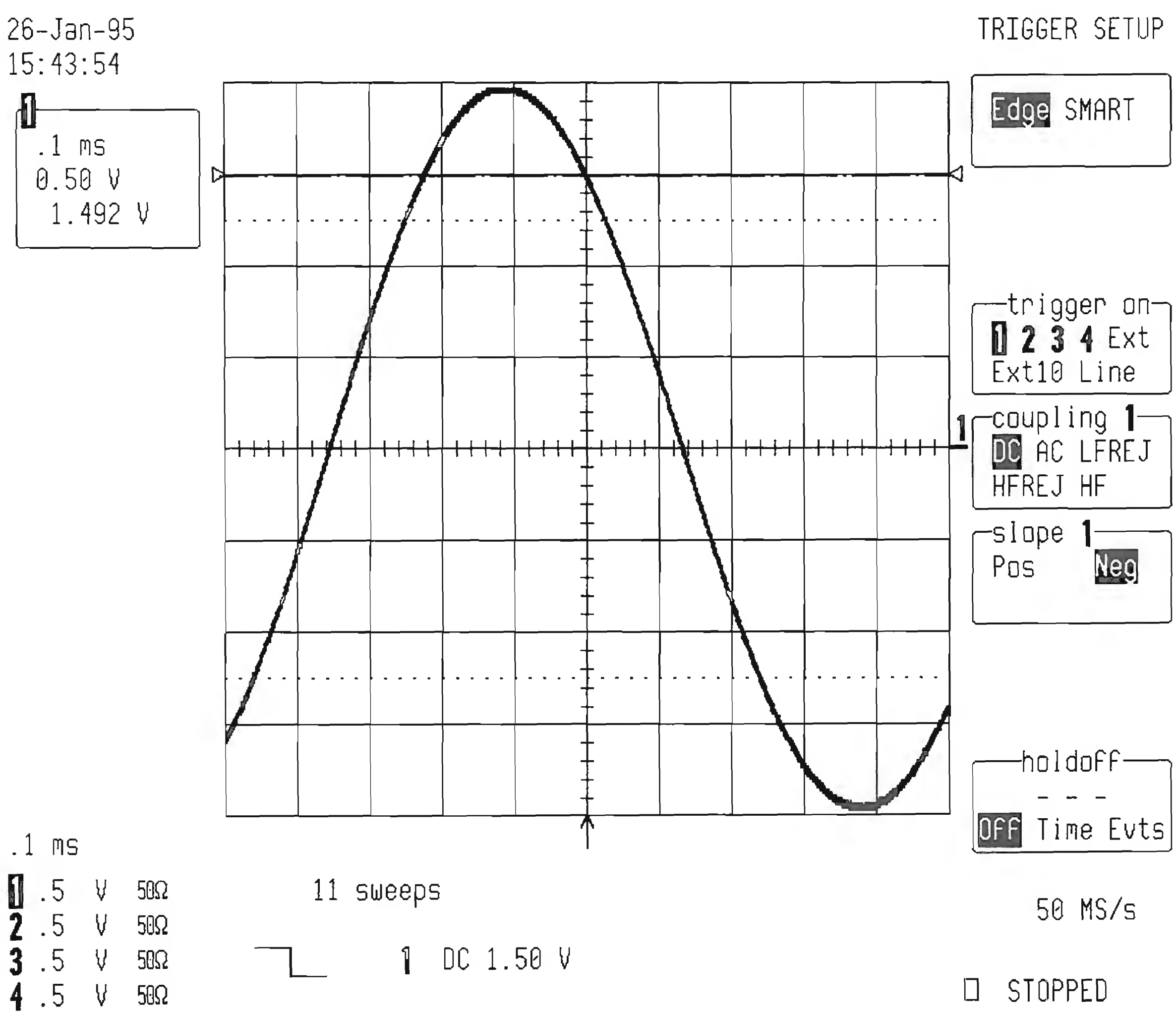
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**

- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).

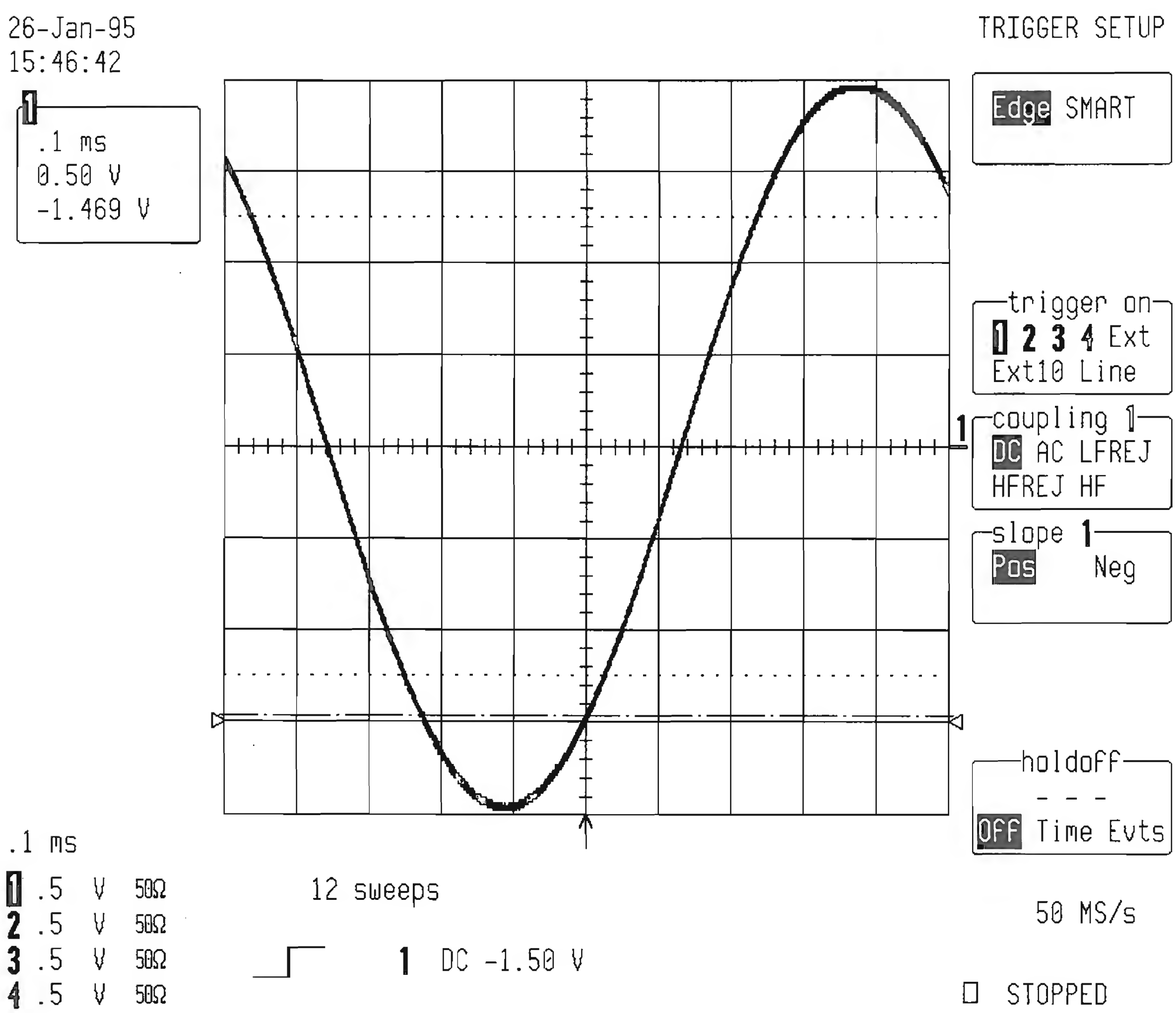
- Check that the **vertical crossing point level is + 1.5 V ± .2 V.** See icon 1 at top left.



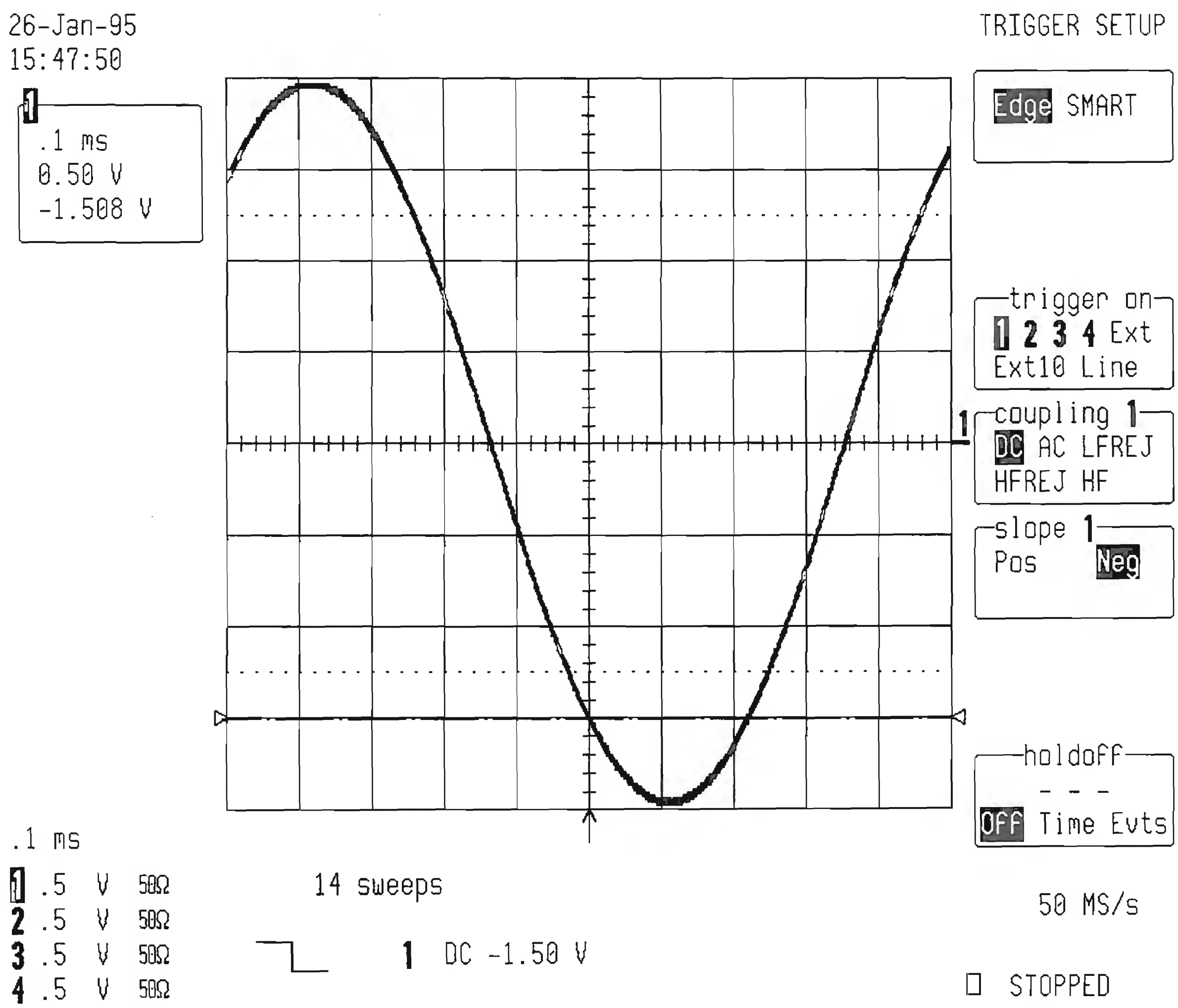
- Set Trigger Slope 1 : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is + 1.5 V** ± **.2 V.** See icon at top left.



- Set Trigger level : **DC - 1.5 V**
- Set Trigger Slope 1 : **Pos**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 1.5 V ± .2 V.** See icon **1** at top left.



- Set Trigger Slope 1 : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 1.5 V ± .2 V.** See icon 1 at top left.



- Repeat step 5.10.2 for Channel 2, Channel 3 and Channel 4 substituting channel control and input connector.

5.10.3 External Trigger

Specifications

External trigger range : DC ± .5 V

Procedure

- Connect the output of the generator to External input and to Channel 2 via a coaxial T-connector. The cable length from External to Channel 2 must be short, at most 2 nsec.

- Set frequency : **1 KHz**
- Turn on trace : **Ch2**
- Input Coupling Ch 2 : **DC 50 Ω**
- V/div. offset : **Normal**
- Input gain : **100 mV/div.**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Ext**
- Coupling Ext : **DC**
- Slope Ext : **Pos**
- External : **DC 1MΩ**
- Set Ext Trigger level : **DC 0.0 mV**
- Mode : **Single**
- Pre-Trigger Delay : **50 %**
- Timebase : **.1 msec/div.**
- Channel use : **4**
- Record up to : **50 K samples**

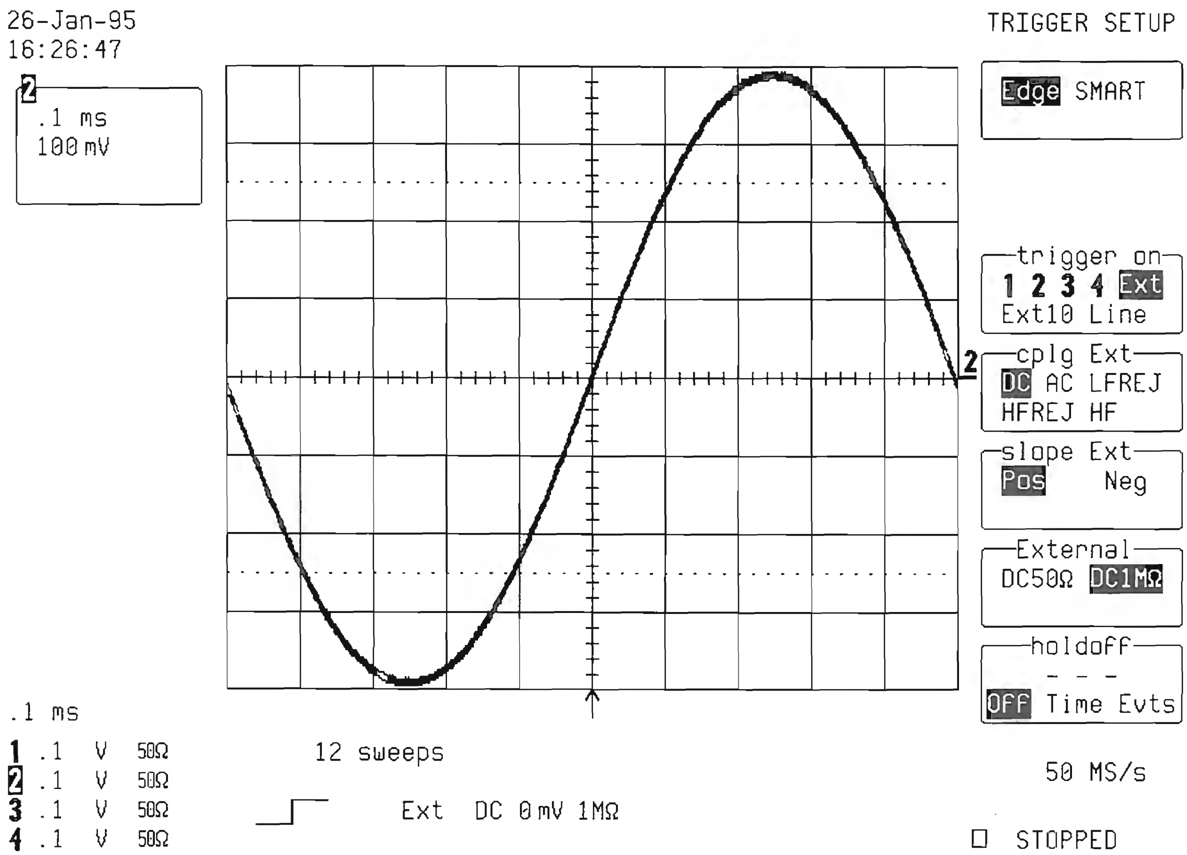
- Adjust the sine wave generator's output amplitude to get **8 divisions peak to peak**, corresponding to a **.8 V** amplitude.
- It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.

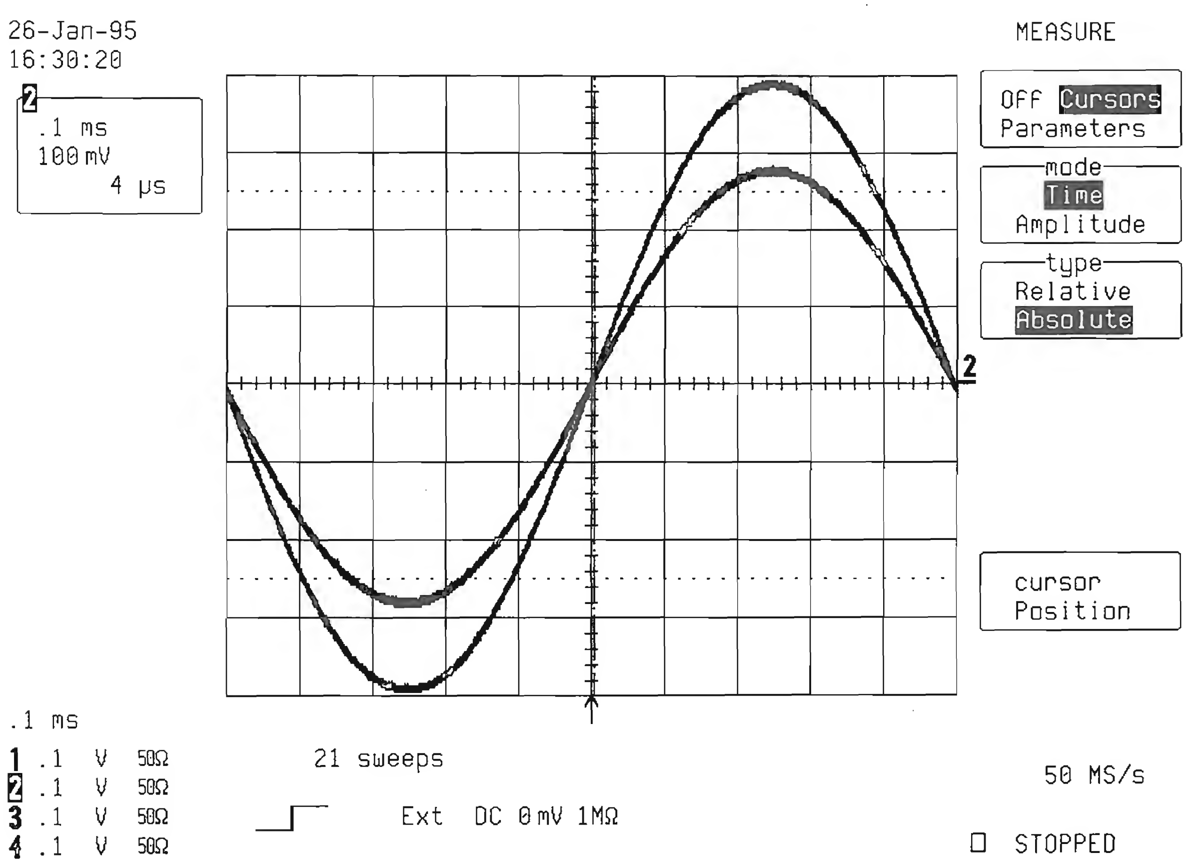
- Display setup : **Dot join Off**
- Set **Persistence On,** and acquire few sweeps in Single Trigger mode.

- Connect a **3 dB attenuator**, and acquire few more sweeps in Single mode.

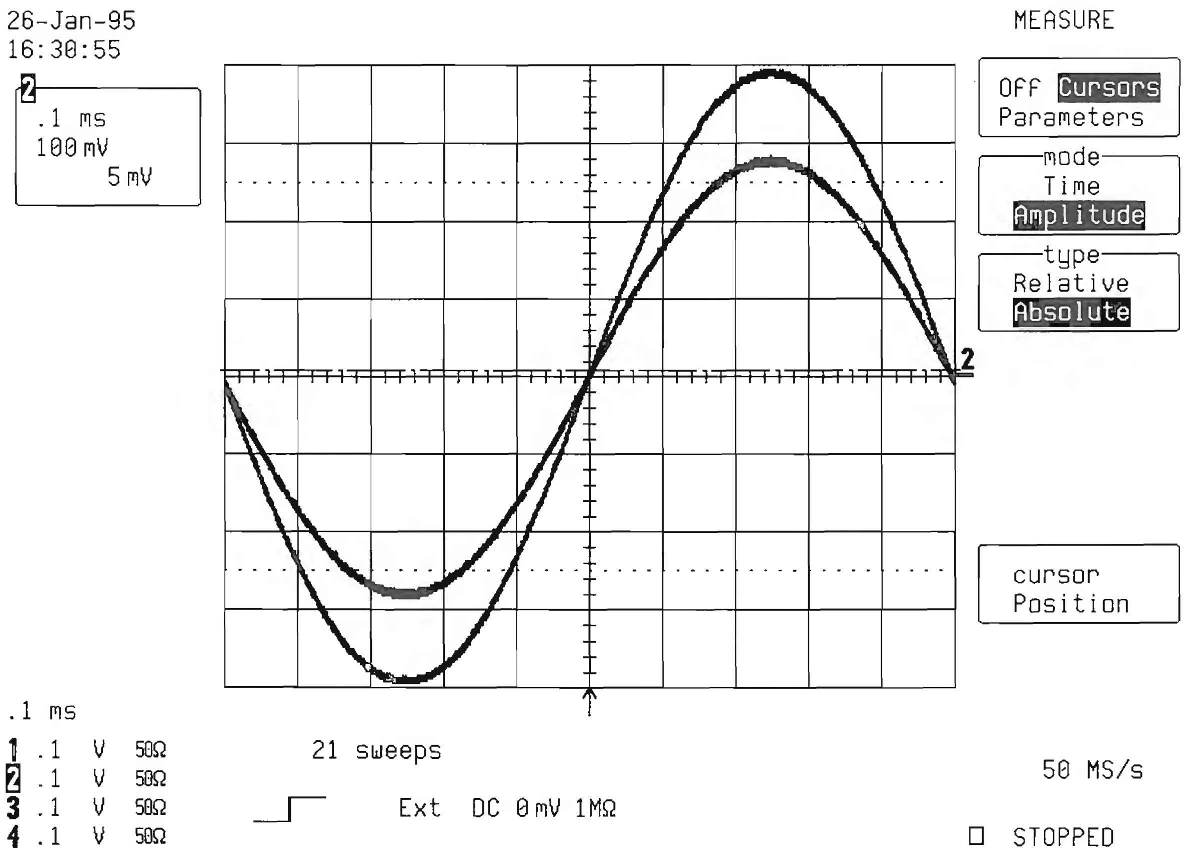
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.

- Check that the **time** difference obtained between the marker and the trigger is within **± 20 µsec.** The time readout is below 100 mV in the icon **2,** at top left.


26-Jan-95
16:26:47
2
.1 ms
100 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext
DC AC LFREJ
HFREJ HF
slope Ext
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
12 sweeps
Ext DC 0 mV 1MΩ
50 MS/s
STOPPED


26-Jan-95
16:30:20
2
.1 ms
100 mV
4 μs
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
21 sweeps
Ext DC 0 mV 1MΩ
50 MS/s
STOPPED

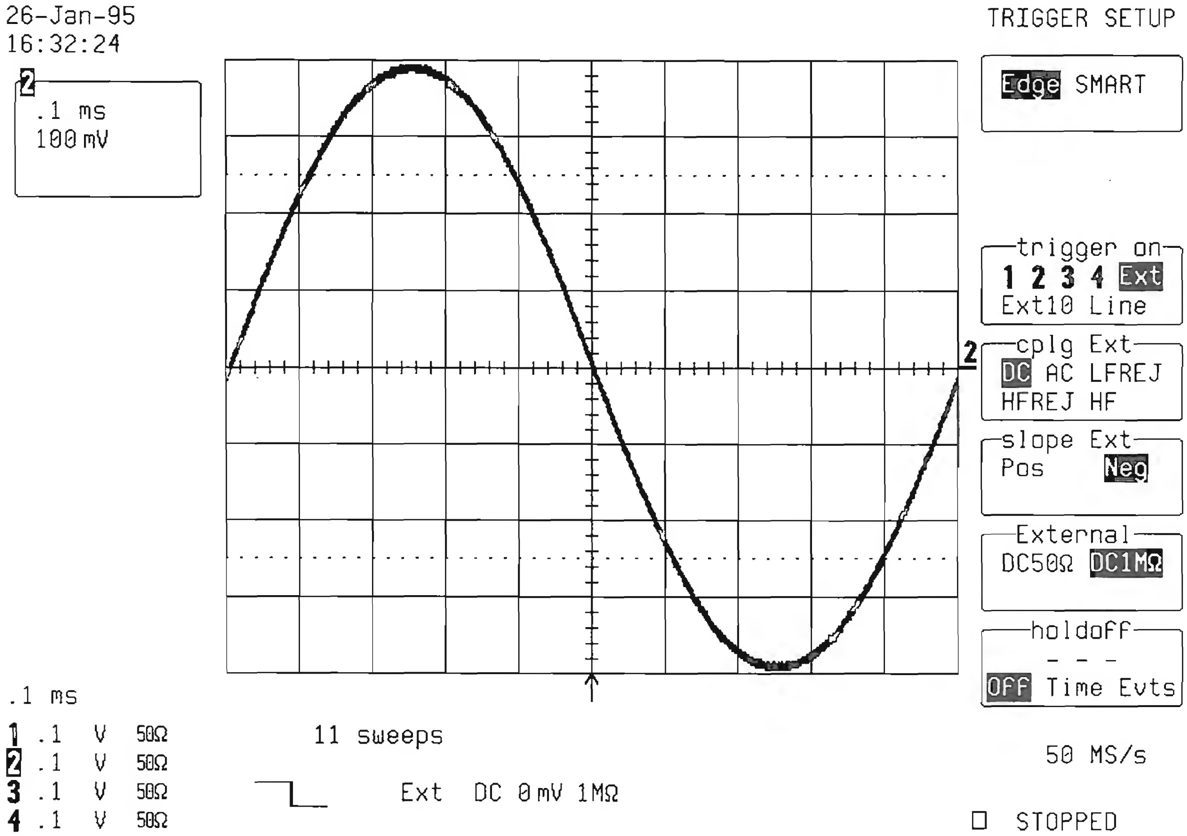
- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the vertical crossing point of the two sine waves.
- Check that the **vertical crossing point level is within** ± **40 mV.** See icon 2 at top left.

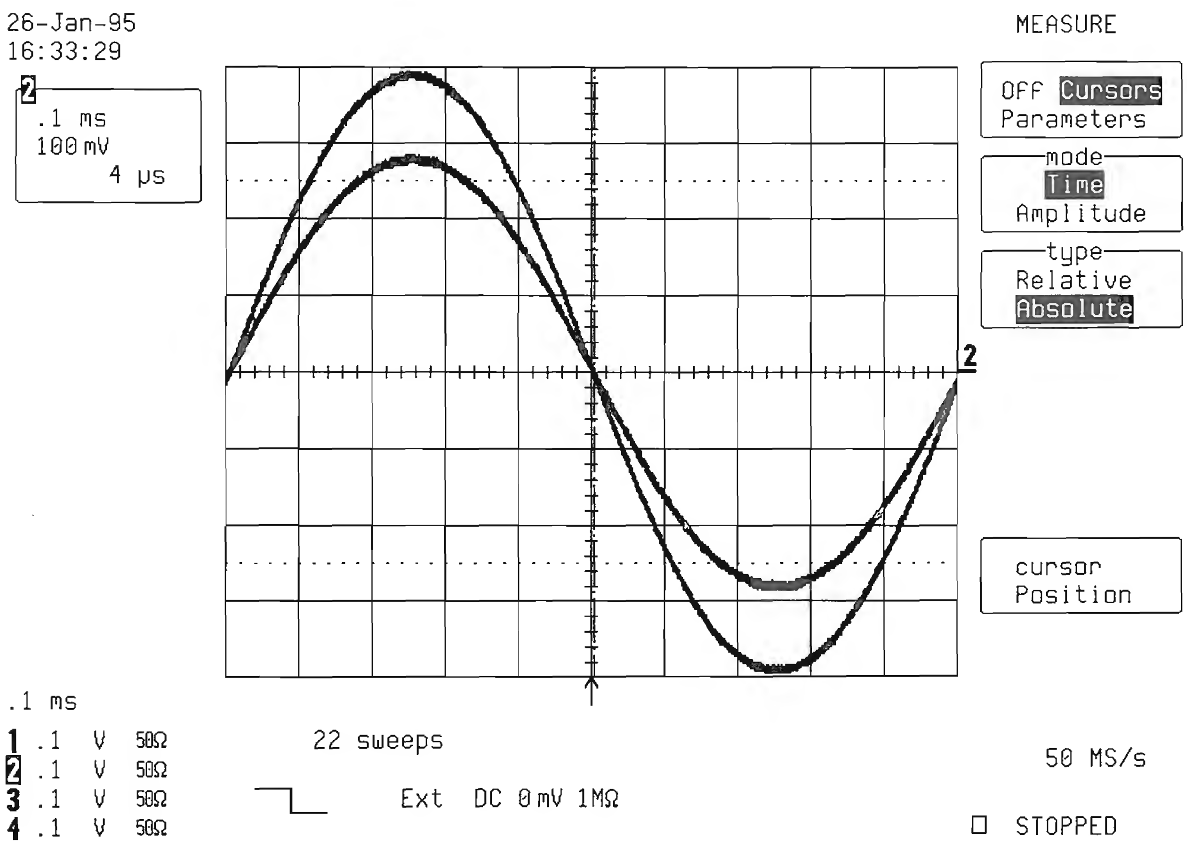


- Set Slope Ext : **Neg**

- Disconnect the **3 dB attenuator** from the BNC input
- Acquire few sweeps in Single Trigger mode.
- Connect the **3 dB attenuator**, and acquire few more sweeps in Single mode.
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.

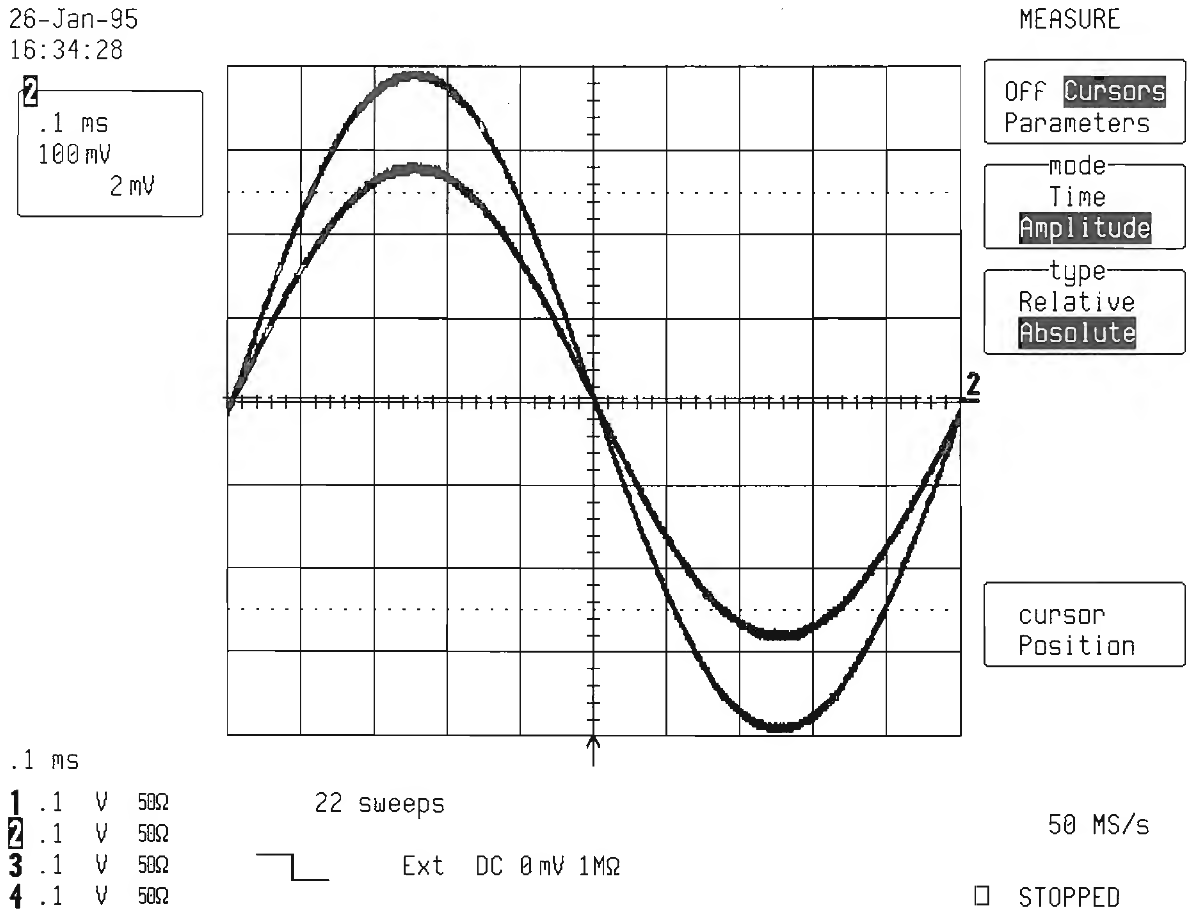
- Check that the **time** difference obtained between the marker and the trigger is within ± **20 μ sec.** The time readout is below 100 mV in the icon **2,** at top left.


26-Jan-95
16:32:24
2
.1 ms
100 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext
DC AC LFREJ
HFREJ HF
slope Ext
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
11 sweeps
Ext DC 0 mV 1MΩ
50 MS/s
STOPPED


26-Jan-95
16:33:29
2
.1 ms
100 mV
4 μs
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
22 sweeps
Ext DC 0 mV 1MΩ
50 MS/s
STOPPED

- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.

- Check that the **voltage** difference obtained between the marker and the trigger level is within ± **40 mV.** The level readout is below 100 mV in the icon **2,** at top left.

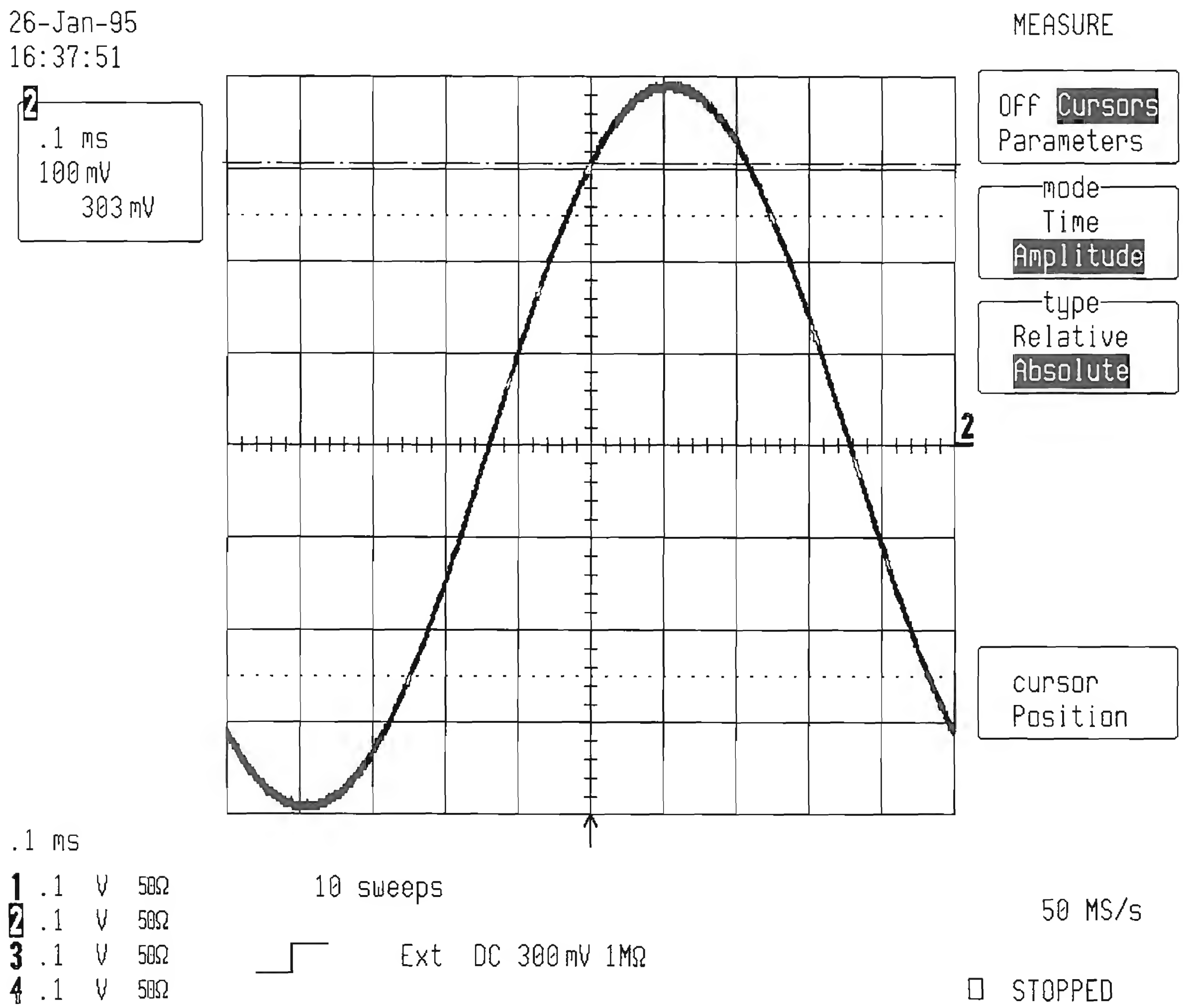


- Set Trigger level : **DC + 300 mV**

- Disconnect the **3 dB attenuator** from the BNC input
- Set Trigger Slope Ext : **Pos**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.

- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).

- Check that the **vertical crossing point level is + 300 mV ± 40 mV.** See icon **2** at top.

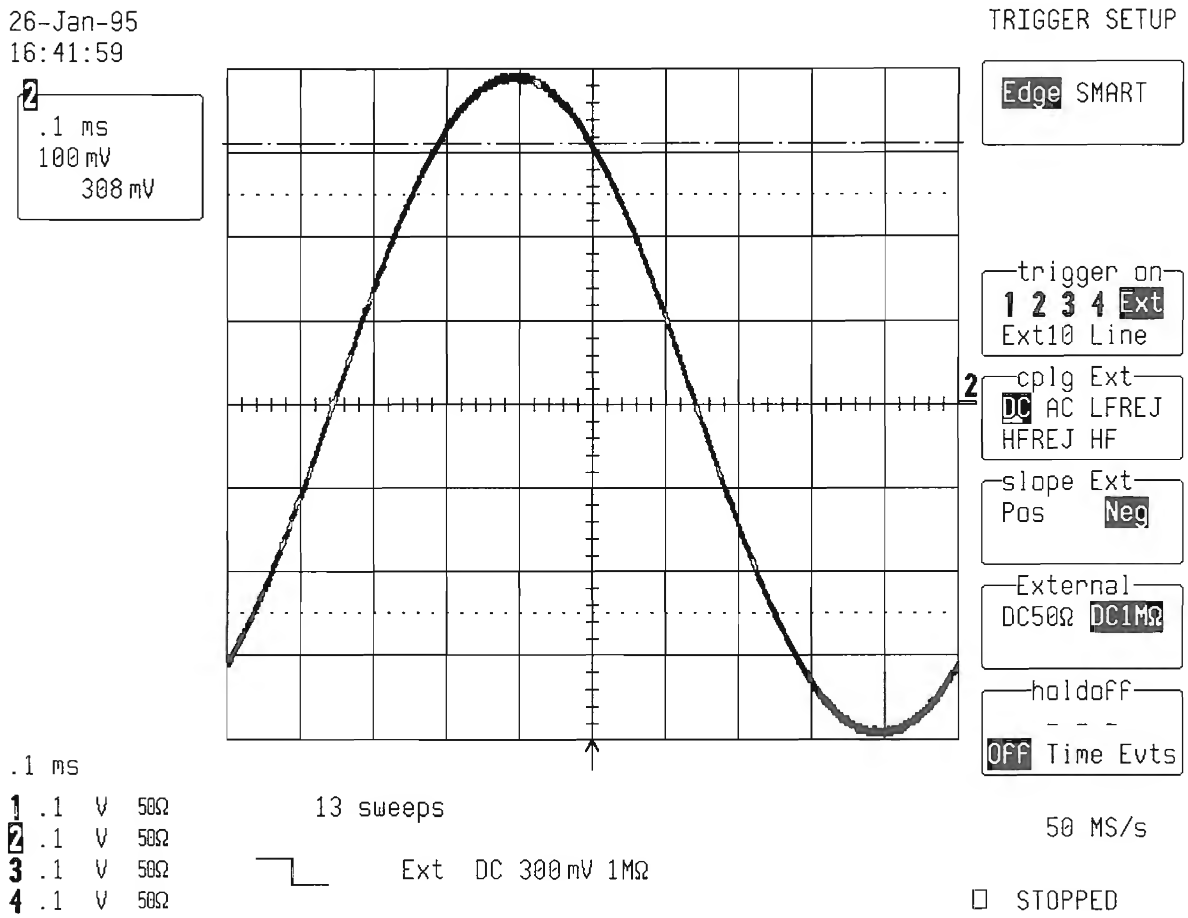


- Set Trigger Slope Ext : **Neg**

- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.

- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).

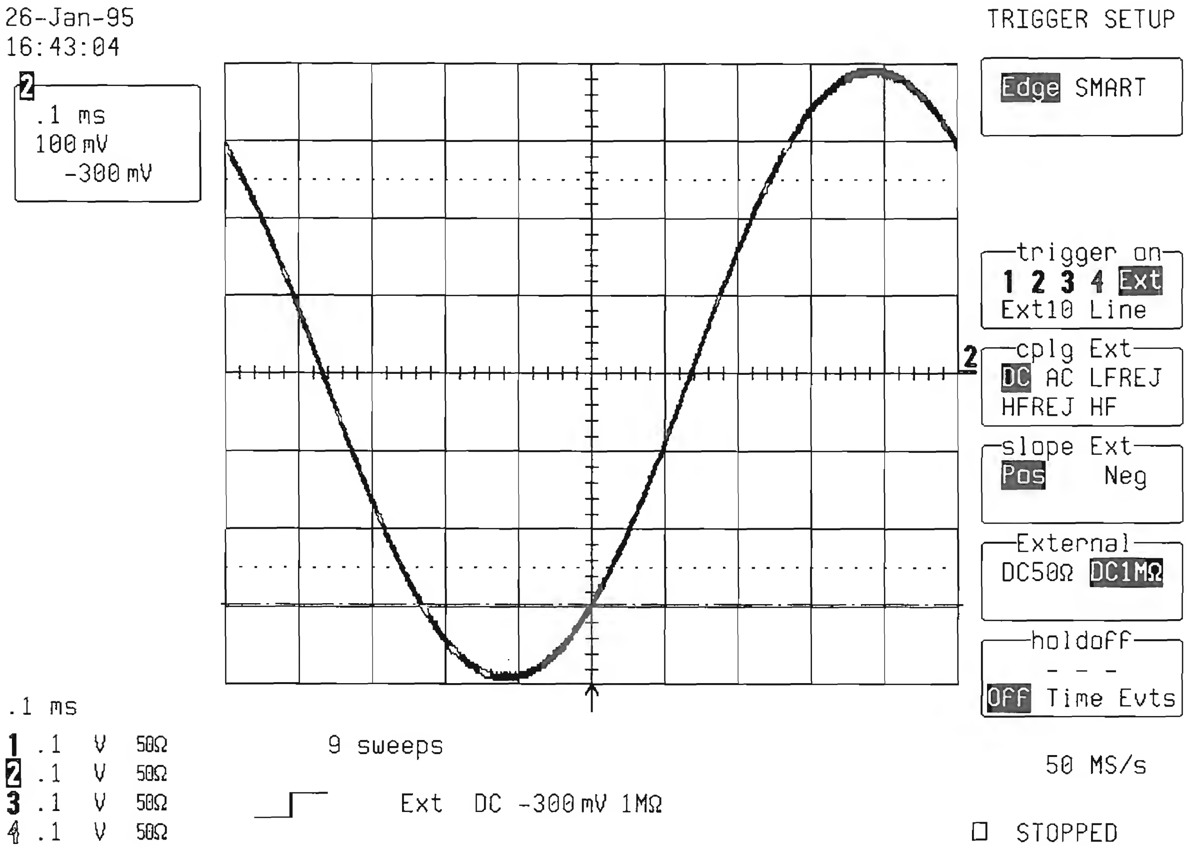
- Check that the **vertical crossing point level is + 300 mV ± 40 mV.** See icon 2 at top .

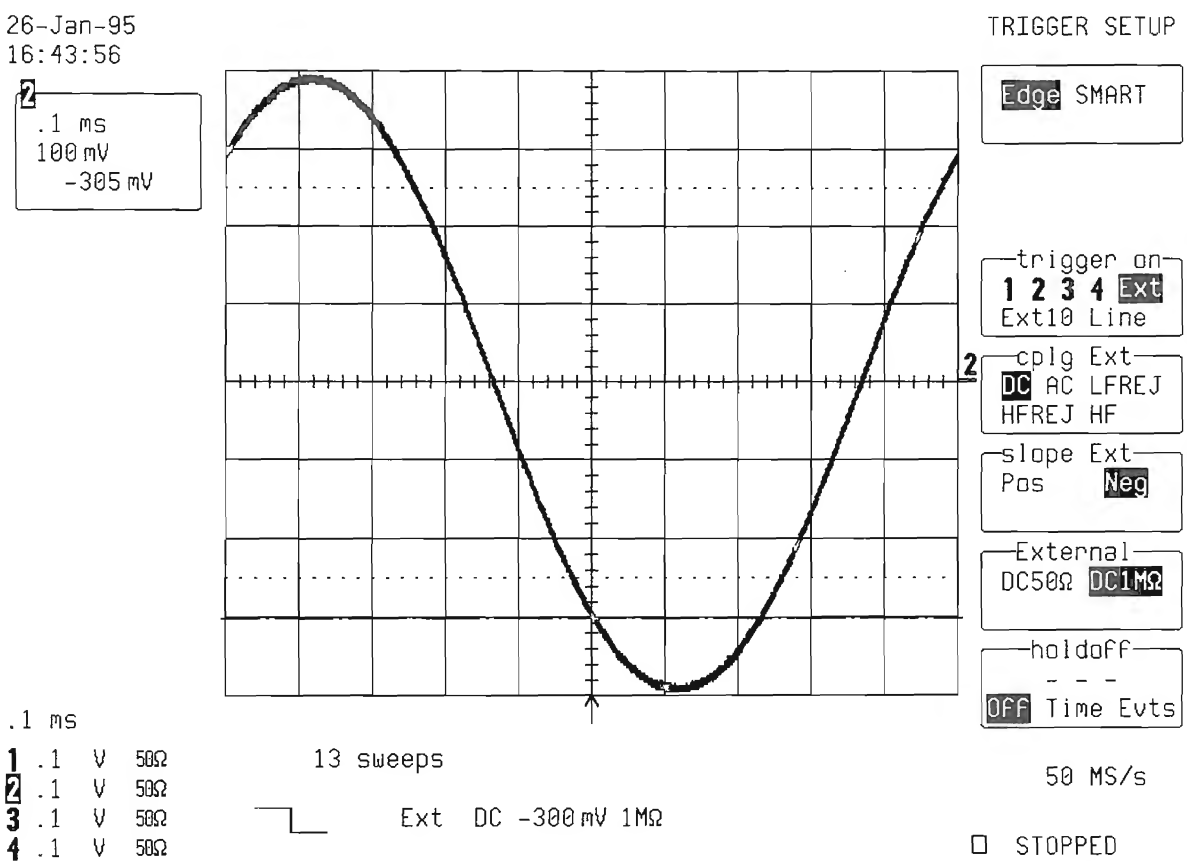


- Set Trigger level : **DC - 300 mV**

- Set Trigger Slope Ext : **Pos**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 300 mV ± 40 mV.** See icon **2** at top.

- Set Trigger Slope Ext : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 300 mV ± 40 mV.** See icon 2 at top.


26-Jan-95
16:43:04
2
.1 ms
100 mV
-300 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
2
cplg Ext
DC AC LFREJ
HFREJ HF
slope Ext
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
9 sweeps
Ext DC -300 mV 1MΩ
50 MS/s
STOPPED


26-Jan-95
16:43:56
2
.1 ms
100 mV
-305 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
2
cplg Ext
DC AC LFREJ
HFREJ HF
slope Ext
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
13 sweeps
Ext DC -300 mV 1MΩ
50 MS/s
STOPPED

5.10.4 External /10 Trigger

Specifications

External trigger range : DC ± 5 V

Procedure

- Connect the output of the generator to External input and to Channel 2 via a coaxial T-connector. The cable length from External to Channel 2 must be short, at most 2 nsec.
- Set frequency : **1 KHz**

- Turn on trace : **Ch2**
- Input Coupling Ch 2 : **DC 50 Ω**
- V/div. offset : **Normal**
- Input gain : **1 V/div.**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Ext10**
- Coupling Ext10 : **DC**
- Slope Ext10 : **Pos**
- External : **DC 1MΩ**
- Set Ext Trigger level : **DC 0.0 mV**
- Mode : **Single**
- Pre-Trigger Delay : **50 %**
- Timebase : **.1 msec/div.**
- Channel use : **4**
- Record up to : **50 K samples**

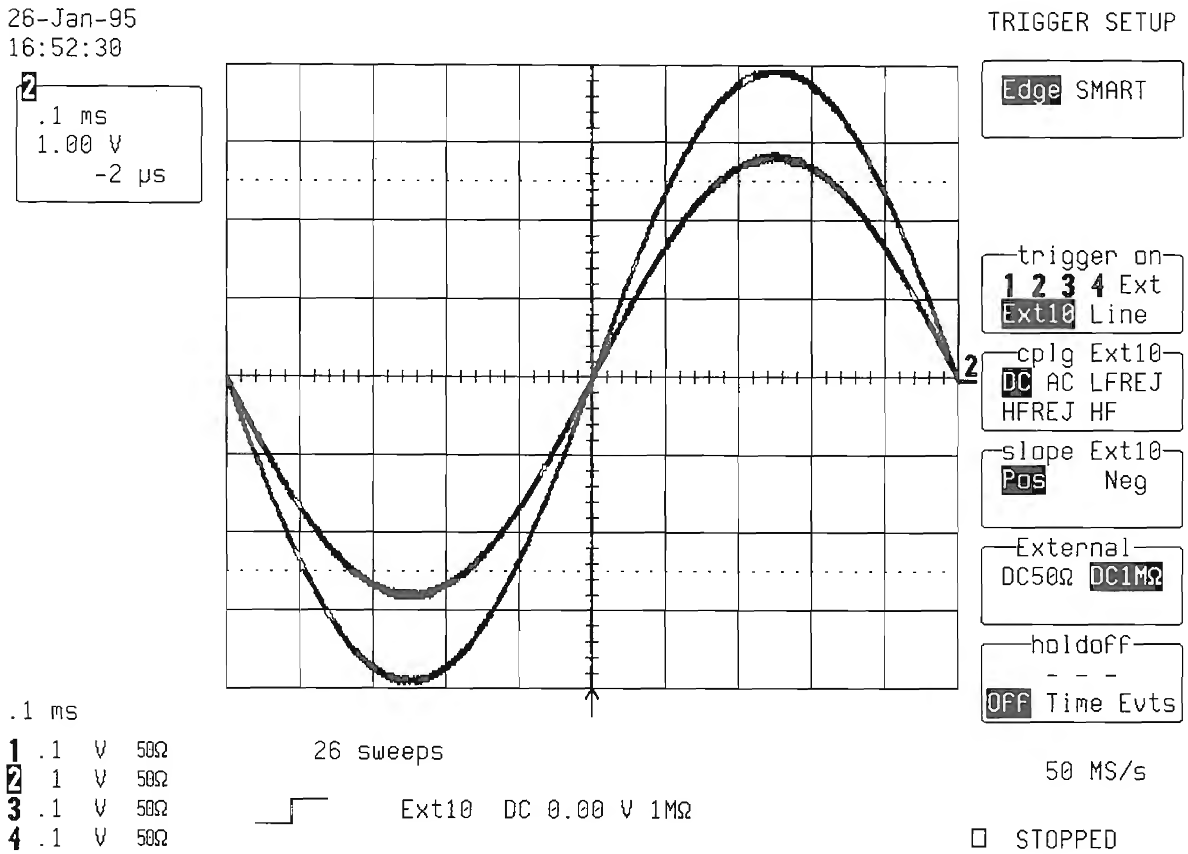
- Adjust the sine wave generator's output amplitude to get **8 divisions peak to peak**, corresponding to a **8 V** amplitude.
- It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.

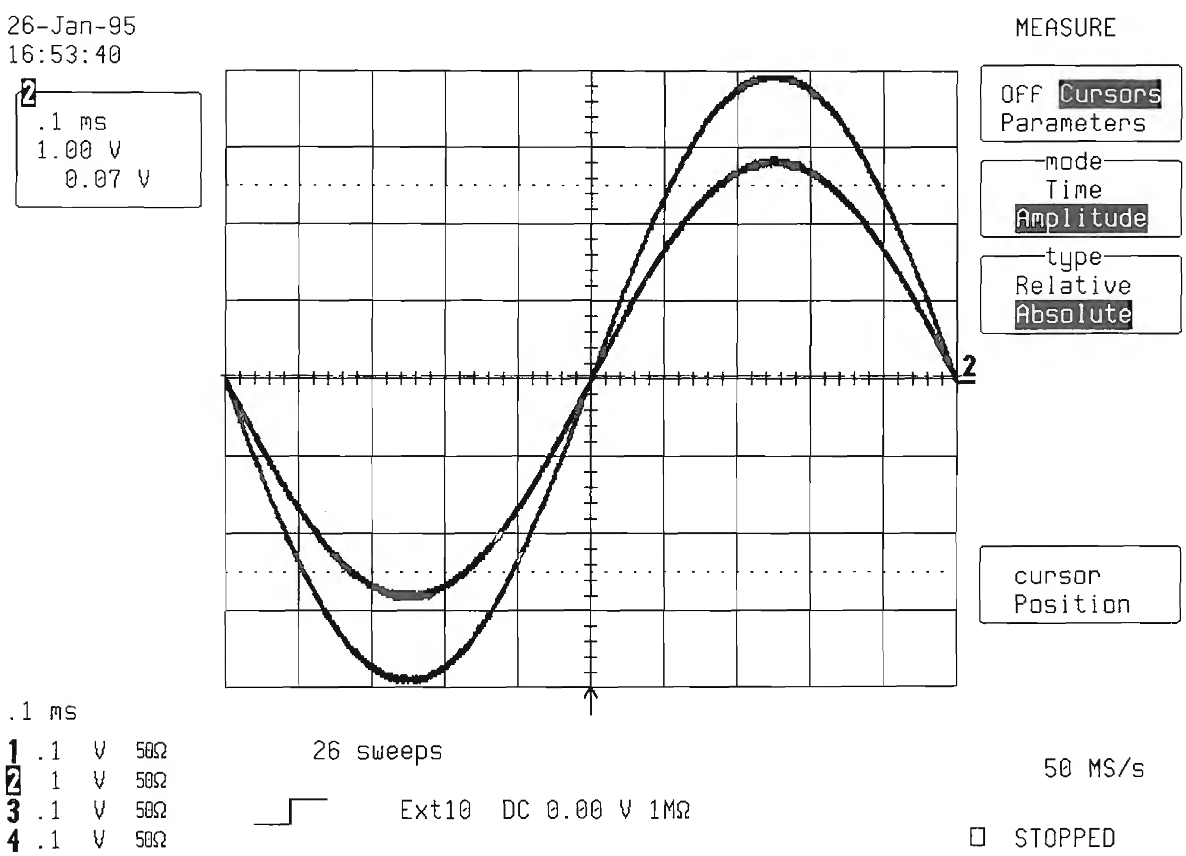
- Display setup : **Dot join Off**
- Set **Persistence On,** and acquire few sweeps in Single Trigger mode.

- Connect a **3 dB attenuator**, and acquire few more sweeps in Single mode.

- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.

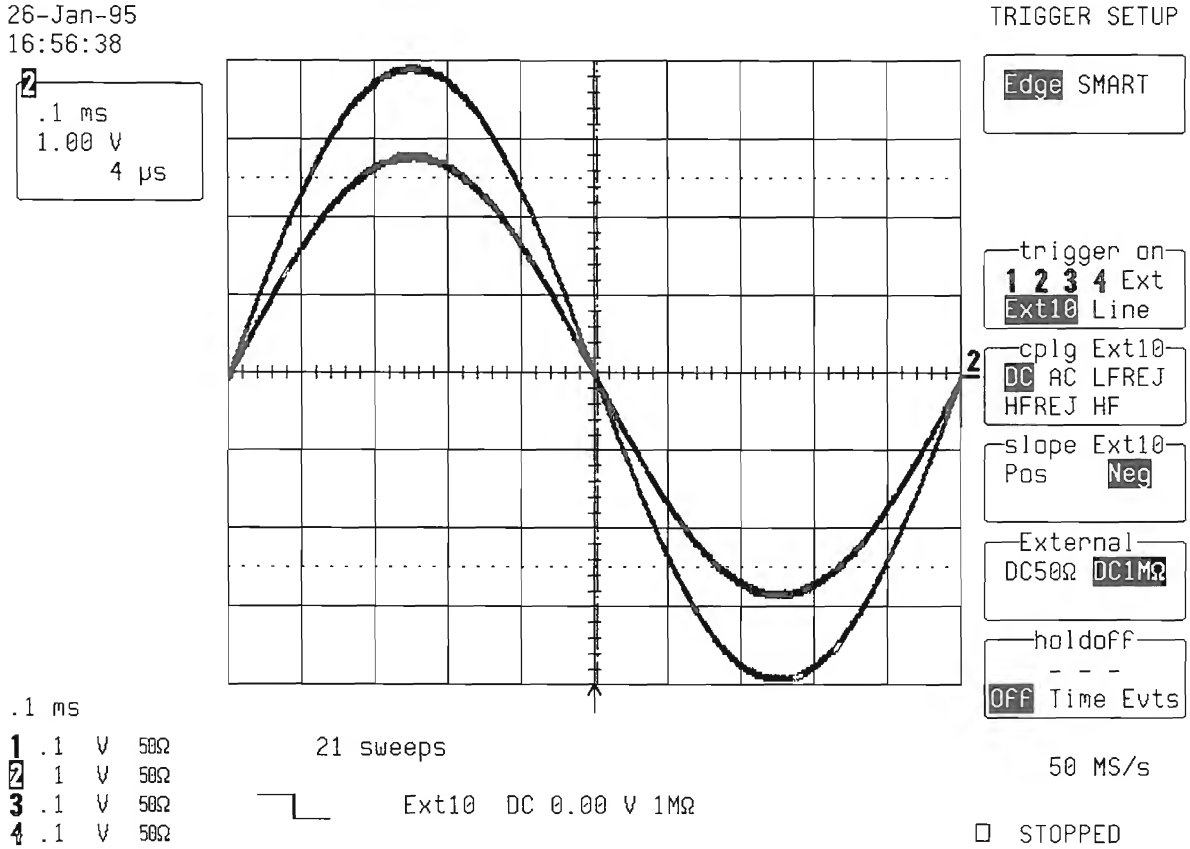
- Check that the **time** difference obtained between the marker and the trigger is within ± **20 μsec.** The time readout is below 1 V in the icon **2,** at top left.

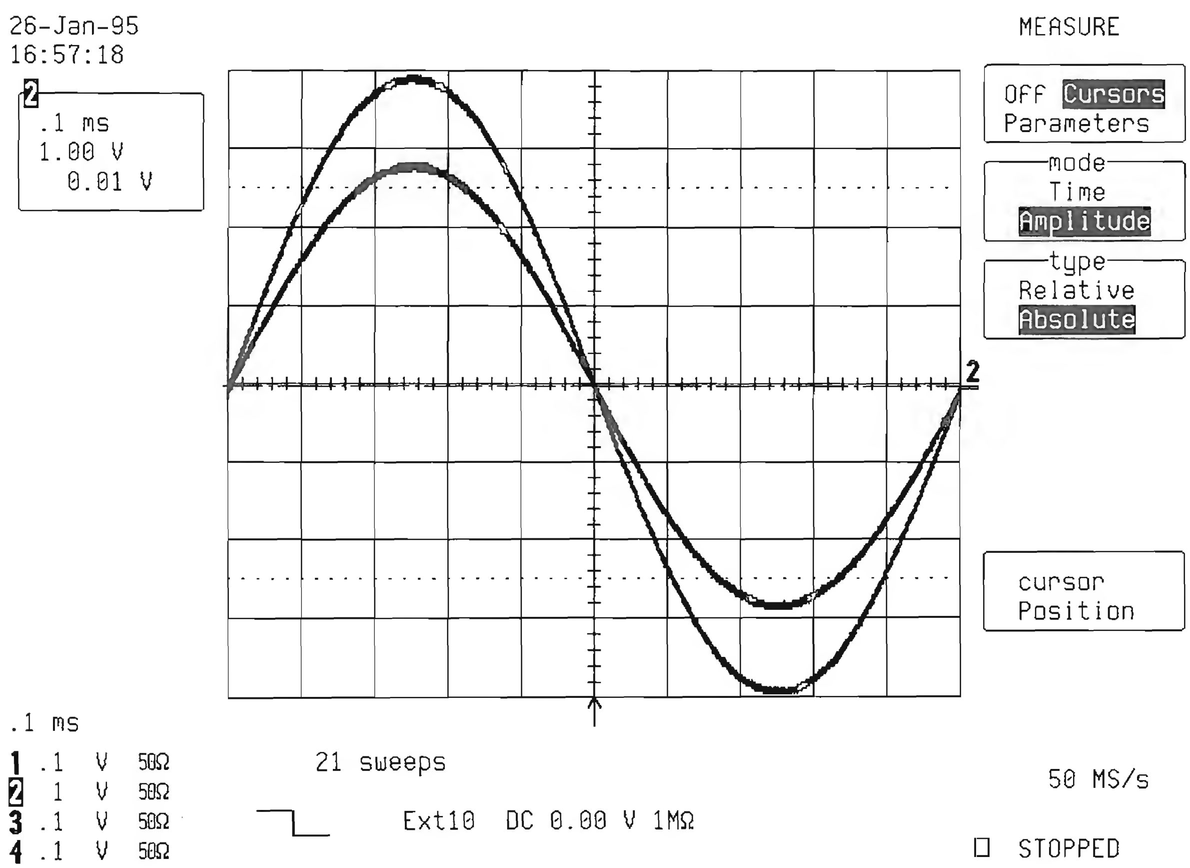

26-Jan-95
16:52:30
TRIGGER SETUP
2
.1 ms
1.00 V
-2 µs
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext10
DC AC LFREJ
HFREJ HF
slope Ext10
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
26 sweeps
Ext10 DC 0.00 V 1MΩ
50 MS/s
STOPPED


26-Jan-95
16:53:40
MEASURE
2
.1 ms
1.00 V
0.07 V
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .1 V 50Ω
2 1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
26 sweeps
Ext10 DC 0.00 V 1MΩ
50 MS/s
STOPPED

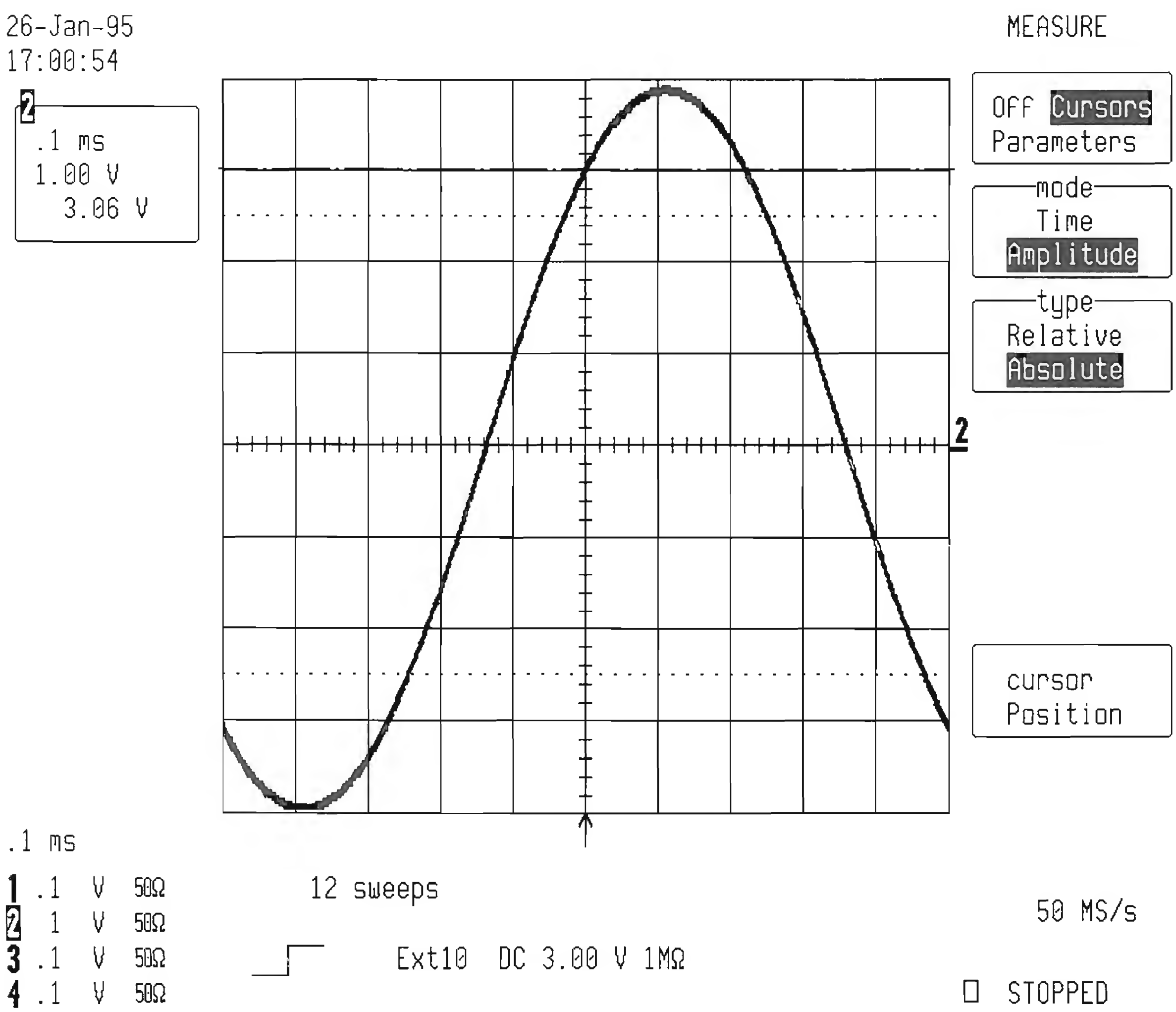
- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.
- Check that the **voltage** difference obtained between the marker and the trigger level is within ± **400 mV.** The level readout is below 1 V in the icon **2,** at top left.

- Set Trigger Slope Ext10 : **Neg**
- Disconnect the **3 dB attenuator** from the BNC input
- Acquire few sweeps in Single Trigger mode.
- Connect the **3 dB attenuator**, and acquire few more sweeps in Single mode.
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.
- Check that the **time** difference obtained between the marker and the trigger is within ± **20 μ sec.** The time readout is below 1 V in the icon **2,** at top left.
- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.
- Check that the **vertical crossing point level is within** ± **400 mV.** See icon **2** at left.

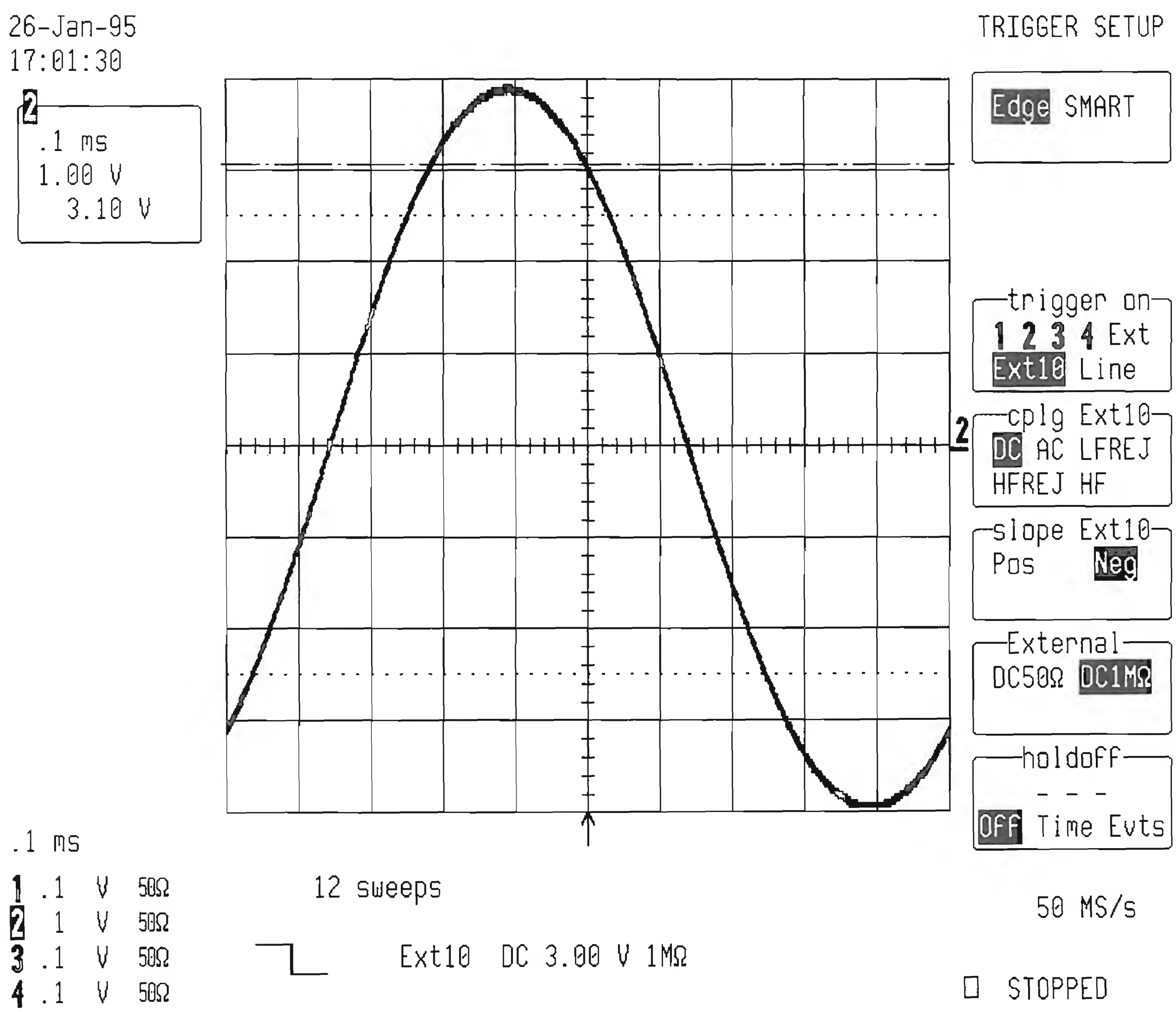

26-Jan-95
16:56:38
TRIGGER SETUP
2
.1 ms
1.00 V
4 µs
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext10
DC AC LFREJ
HFREJ HF
slope Ext10
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
21 sweeps
Ext10 DC 0.00 V 1MΩ
50 MS/s
STOPPED


26-Jan-95
16:57:18
MEASURE
2
.1 ms
1.00 V
0.01 V
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .1 V 50Ω
2 1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
21 sweeps
Ext10 DC 0.00 V 1MΩ
50 MS/s
STOPPED

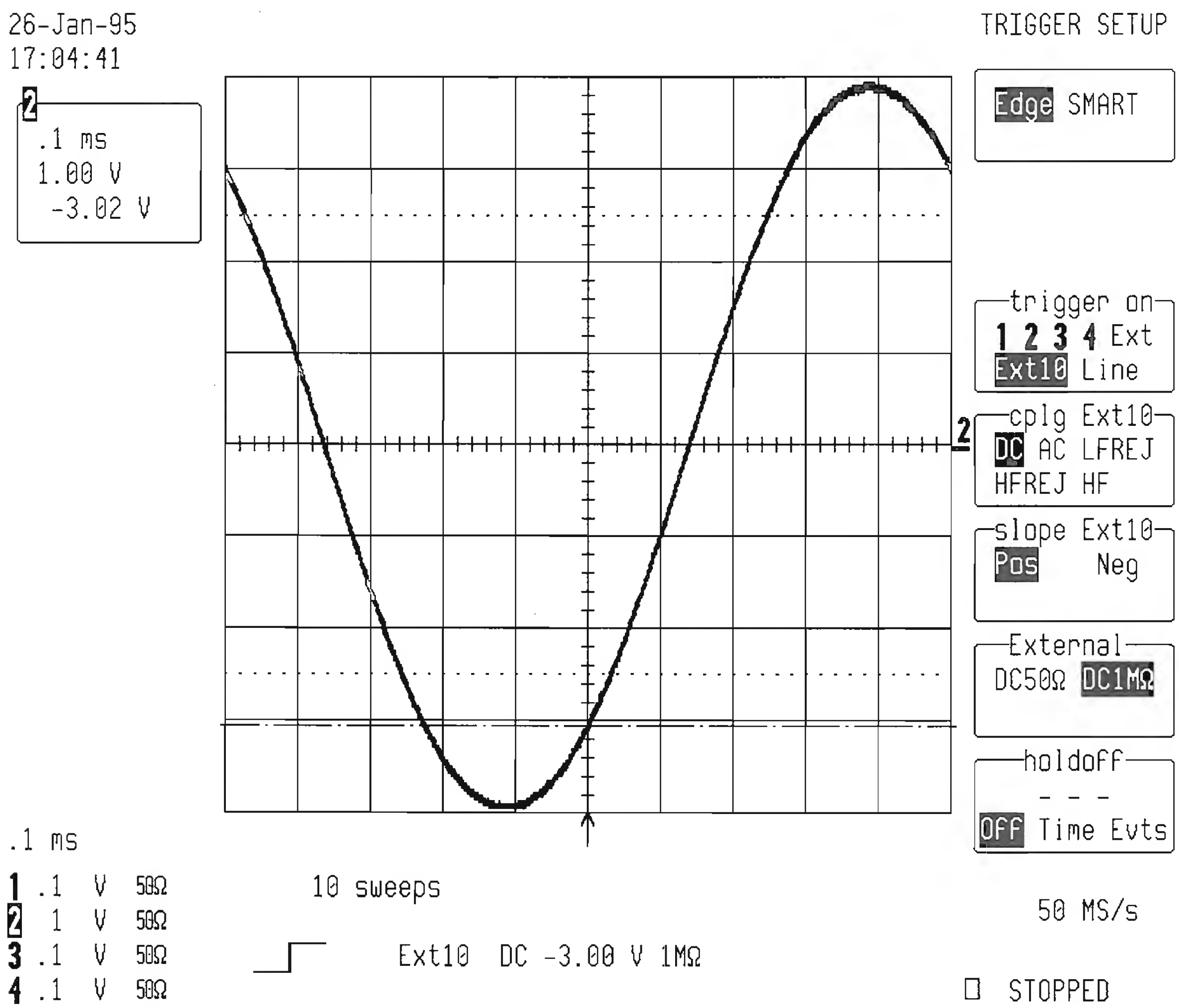
- Set Trigger level : **DC + 3 V**
- Set Trigger Slope Ext10 : **Pos**
- Disconnect the **3 dB attenuator** from the BNC input
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is + 3 V ± 400 mV.** See icon **2** at top.



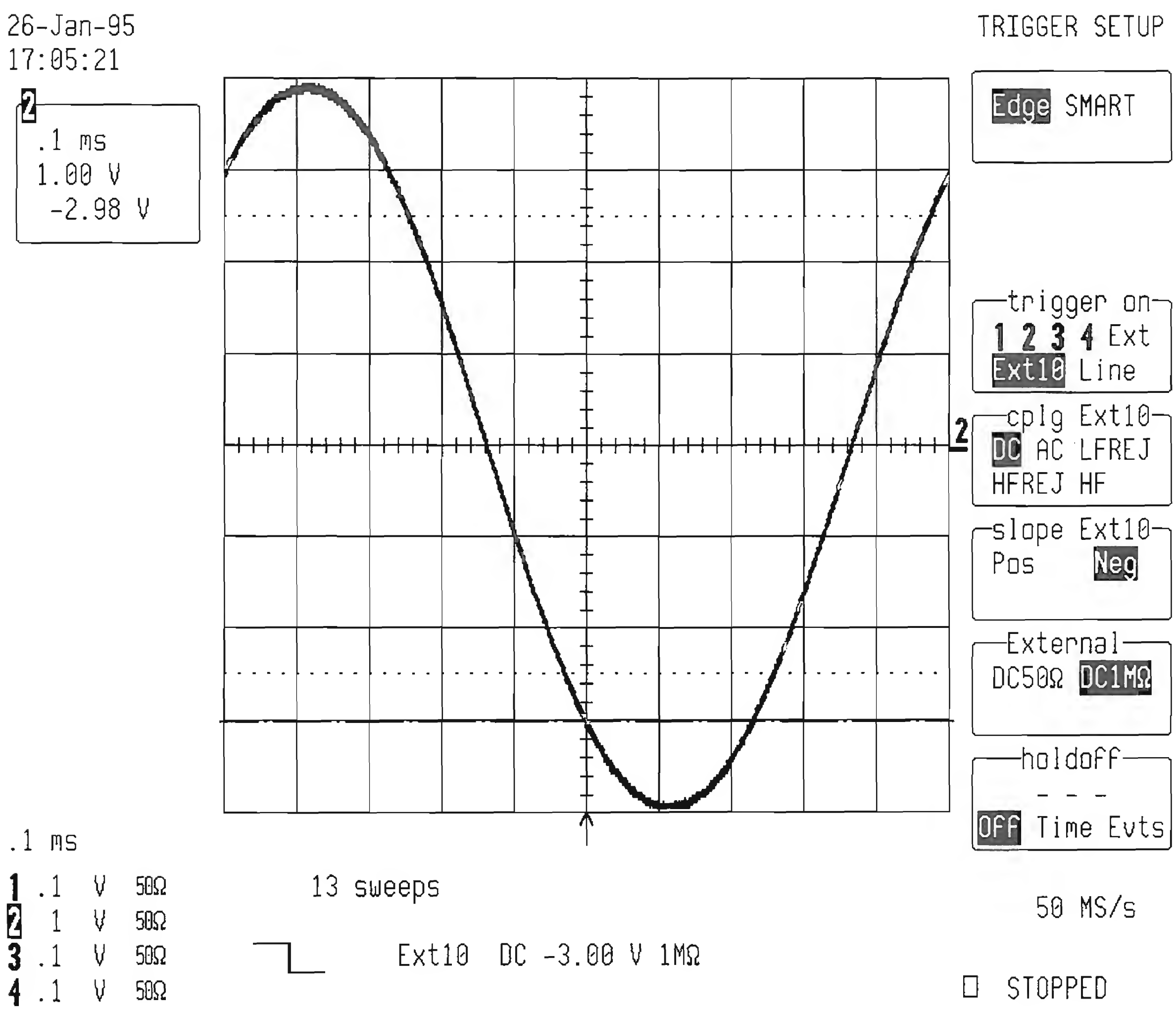
- Set Trigger Slope Ext10 : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is + 3 V ± 400 mV.** See icon **2** at top .



- Set Trigger level : **DC - 3 V**
- Trigger Slope Ext10 : **Pos**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 3 V ± 400 mV.** See icon **2** at top.



- Trigger Slope Ext10 : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions.**
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 3 V ± 400 mV.** See icon 2 at top.



5.11 Smart Trigger

Specifications

Pulse width < or > 2.5 nsec to 20 sec.

5.11.1 Trigger on Pulse Width < 10 nsec

Procedure

- Connect a leveled sine wave generator to Channel 1

▪ Frequency	:	**100 MHz**
▪ Turn on trace	:	**Ch1**
▪ Display setup	:	**Standard, Persistence off, Dot join on, Single grid**
▪ Input Coupling	:	**DC 50 Ω**
▪ V/div. offset	:	**Normal**
▪ Global BWL	:	**Off**
▪ Probe atten	:	**X1**
▪ Input gain	:	**.5 V/div.**
▪ Trigger setup	:	**Smart**
▪ Setup Smart Trigger	:	**Glitch**
▪ Trigger on	:	**1**
▪ Coupling 1	:	**DC**
▪ At end of	:	**Neg**
▫ Width	:	**< 10 nsec**
▪ Mode	:	**Norm**
▫ Timebase	:	**5 nsec/div.**

- Adjust the generator output amplitude to get a five division amplitude sine wave.

- Check that the scope triggers

- Switch to Width : **> 10 nsec**

- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.

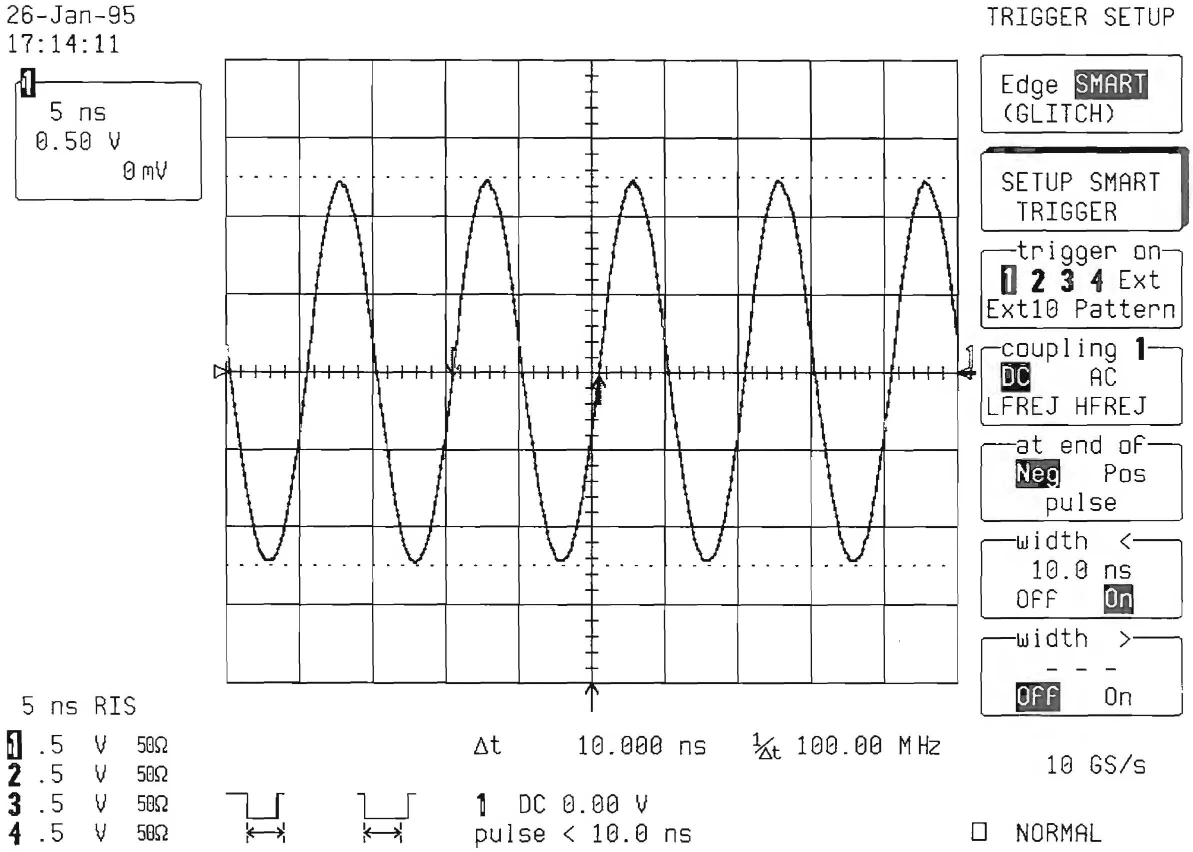
5.11.2 Trigger on Pulse Width > 10 nsec

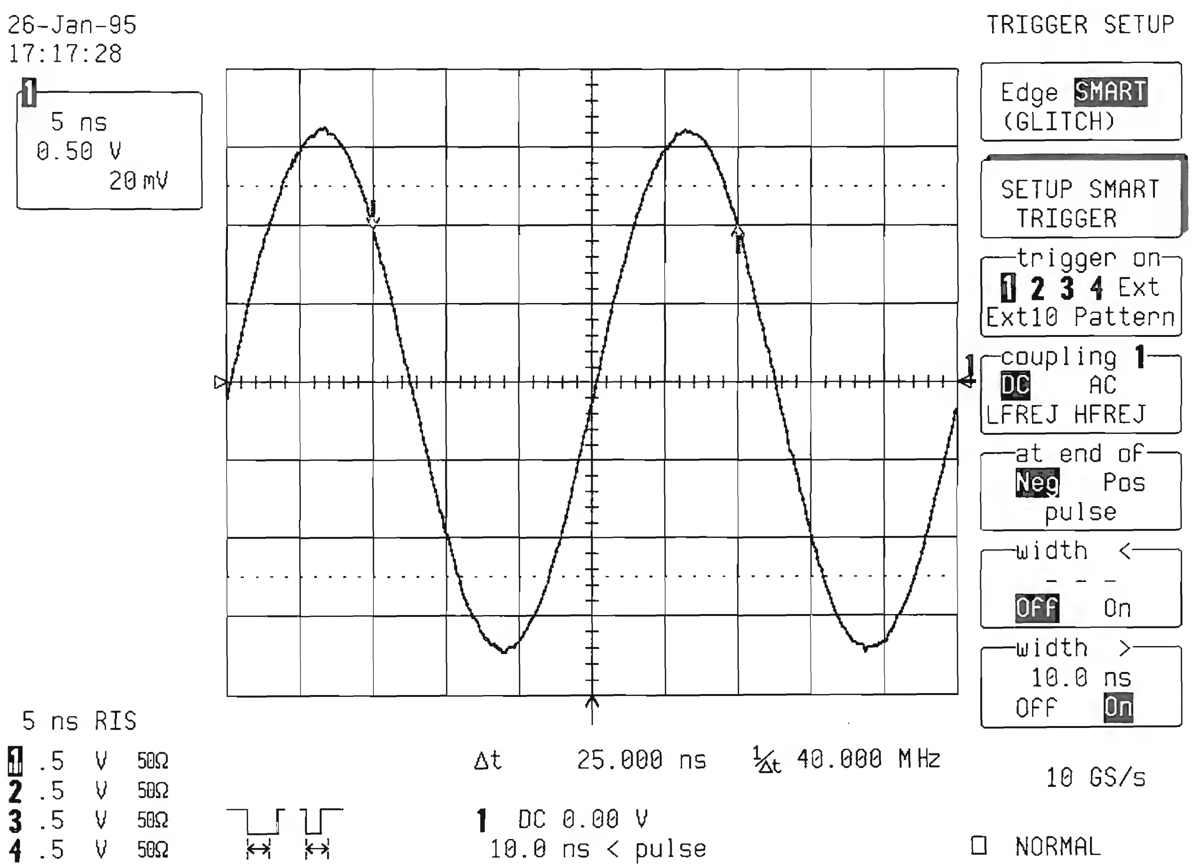
- Adjust the generator frequency to **40 MHz**

- Check that the scope triggers

- Switch to Width : **< 10 nsec**

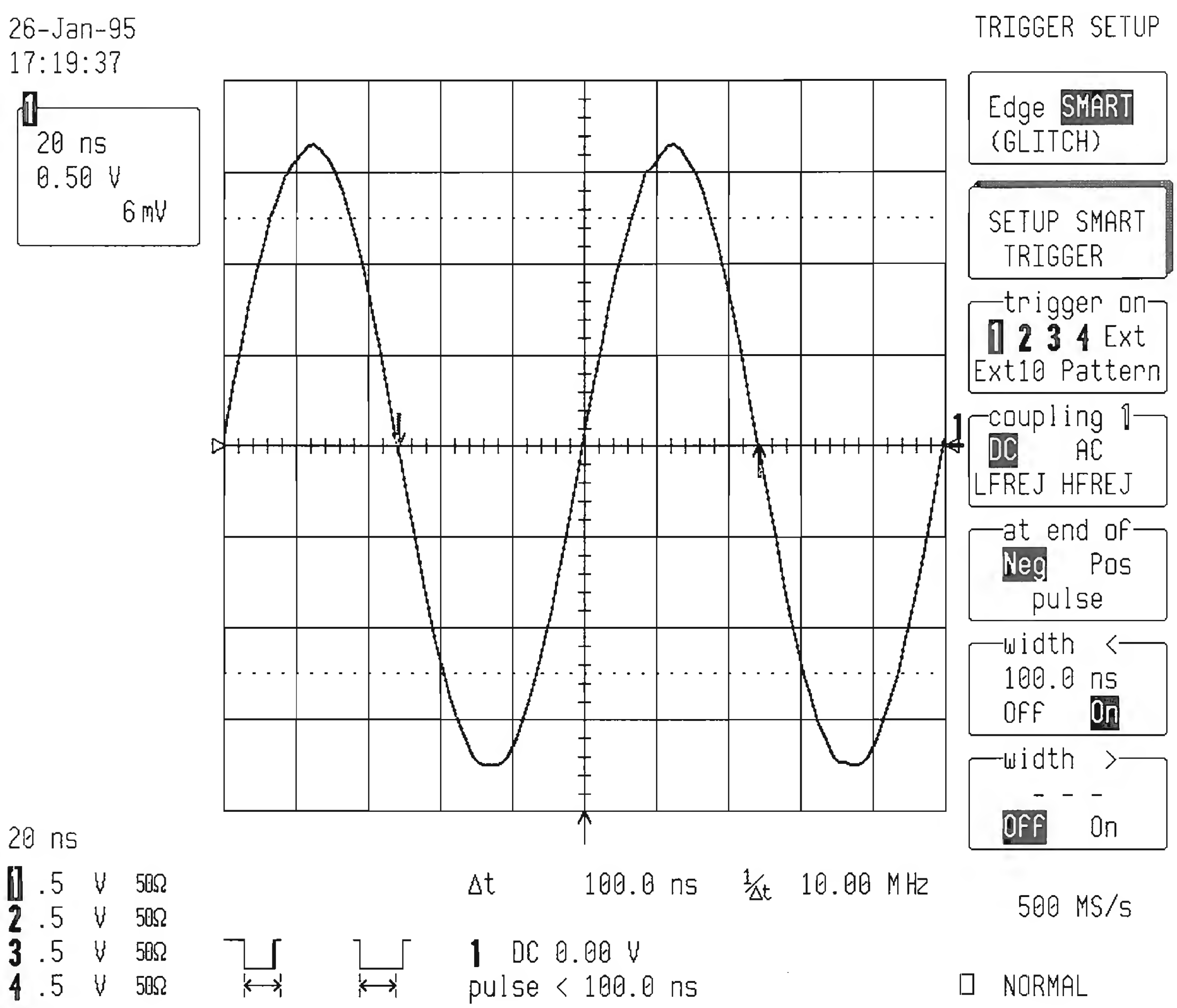
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.


26-Jan-95
17:14:11
TRIGGER SETUP
5 ns
0.50 V
0 mV
Edge SMART
(GLITCH)
SETUP SMART
TRIGGER
trigger on
1 2 3 4 Ext
Ext10 Pattern
coupling 1
DC AC
LFREJ HFREJ
at end of
Neg Pos
pulse
width <
10.0 ns
Off On
width >
- - -
Off On
5 ns RIS
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
Δt 10.000 ns
1/Δt 100.00 MHz
10 GS/s
1 DC 0.00 V
pulse < 10.0 ns
NORMAL


26-Jan-95
17:17:28
TRIGGER SETUP
5 ns
0.50 V
20 mV
Edge SMART
(GLITCH)
SETUP SMART
TRIGGER
trigger on
1 2 3 4 Ext
Ext10 Pattern
coupling 1
DC AC
LFREJ HFREJ
at end of
Neg Pos
pulse
width <
- - -
Off On
width >
10.0 ns
Off On
5 ns RIS
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
Δt 25.000 ns
1/Δt 40.000 MHz
10 GS/s
1 DC 0.00 V
10.0 ns < pulse
NORMAL

5.11.3 Trigger on Pulse Width < 100 nsec

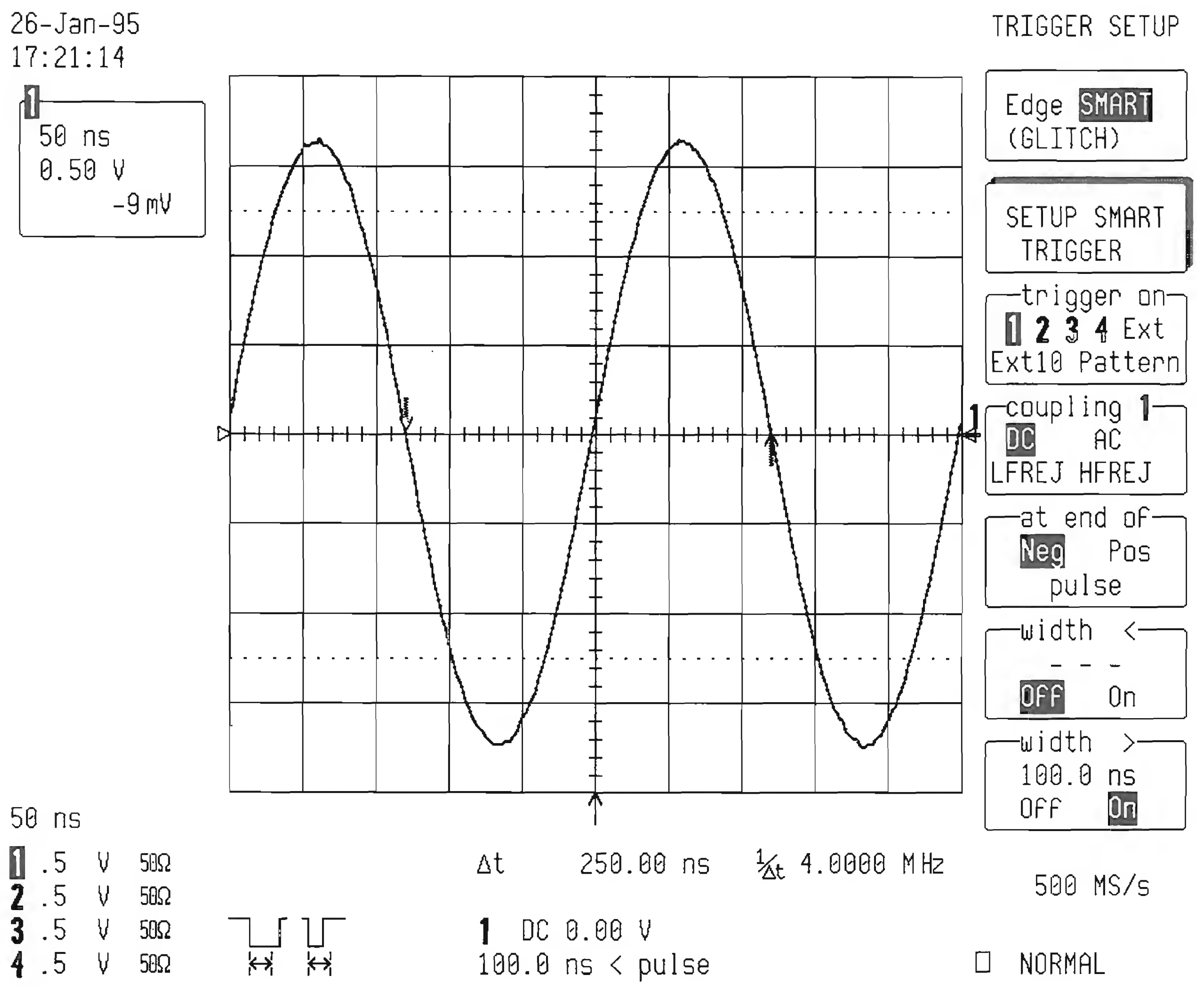
- Set the generator frequency to **10 MHz**
- Pulse width : **< 100 nsec**
- Timebase : **20 nsec/div.**
- Check that the scope triggers.



- Switch to Width : **> 100 nsec**
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.

5.11.4 Trigger on Pulse Width > 100 nsec

- Adjust the generator frequency to **4 MHz**
- Pulse width : > **100 nsec**
- Set Timebase : **50 nsec/div.**
- Check that the scope triggers.



- Switch to Width : < **100 nsec**
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.
- Repeat all the above tests for Channel 2, Channel 3 and Channel 4 substituting channel control and input connector, and check as above.

5.12 Time Base Accuracy

5.12.1 Description

An external sine wave generator of **1 MHz** with a frequency accuracy better than 1 ppm is used.

Specifications

500 MHz clock : accuracy : ≤ ± **0.001 % or** ≤ ± **10 ppm**

5.12.2 500 MHz Clock Manual Verification Procedure

Setup a leveled sine wave generator.

- Frequency : **1 MHz**

- Connect the generator output to Channel 1

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Input gain : **.5 V/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Level 1 : **0.5 V**
- Mode : **Norm**
- Holdoff : **Off**
- Delay : **0 %**
- Timebase : **.5 µsec/div.**
- Channel use : **4**
- Record up to : **50 K**

- Adjust the generator output amplitude and Ch1 offset to get a five divisions peak to peak amplitude sine wave.

- Store Channel 1 in Memory 1

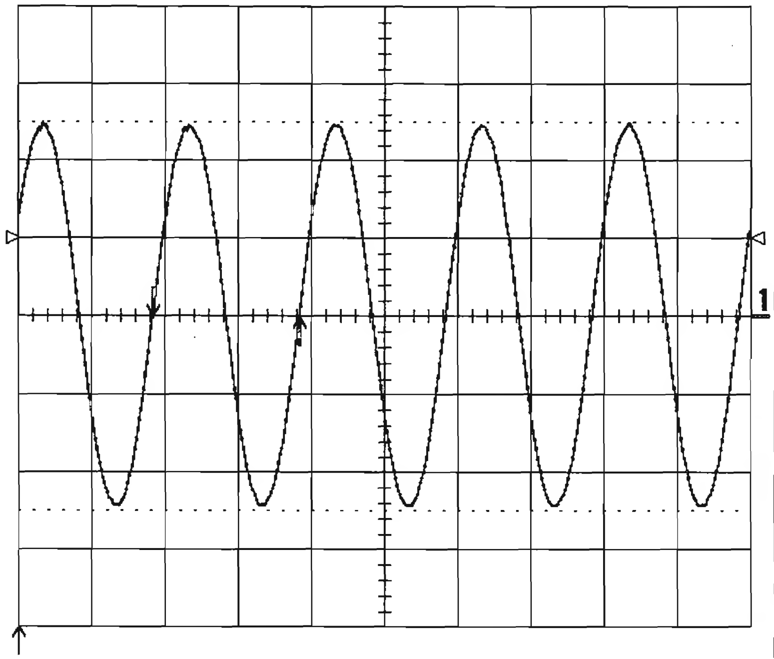
- Set Post-trigger delay to **5.00 msec**

This allows the accuracy of the time base clock to be checked **5000 periods** after the trigger point.

26-Jan-95
17:45:07

STORE W'FORMS

1
.5 µs
0.50 V
-8 mV



DO STORE
(1->M1)

store
1 2
3 4
A B
C D
All displayed

to
M1 M2 M3 M4
Card

.5 µs
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω

Δt 1.0000 µs 1/Δt 1.0000 MHz

1 DC 0.50 V

500 MS/s

☐ NORMAL

26-Jan-95
17:40:20

STATUS

ACQUISITION STATUS

Acquisition
System
Text & Times
Waveform
Memory Used

	1	2	3	4
Vertical				
V/div	.5 V	.5 V	.5 V	.5 V
Probe	x1	x1	x1	x1
Offset	0 mV	0 mV	0 mV	0 mV
Coupling	DC50Ω	DC50Ω	DC50Ω	DC50Ω

Bandwidth Limit OFF

Time base
Time/div .5 µs Time/pnt 2 ns (500 MS/s)
RIS OFF
Sequence OFF Pts/div 250

Trigger Edge Mode NORMAL
External Attenuation x1

1 DC 0.50 V

Post-trigger Delay 5.00000 ms

The currently preselected Smart Trigger type is
GLITCH

500 MS/s

☐ NORMAL

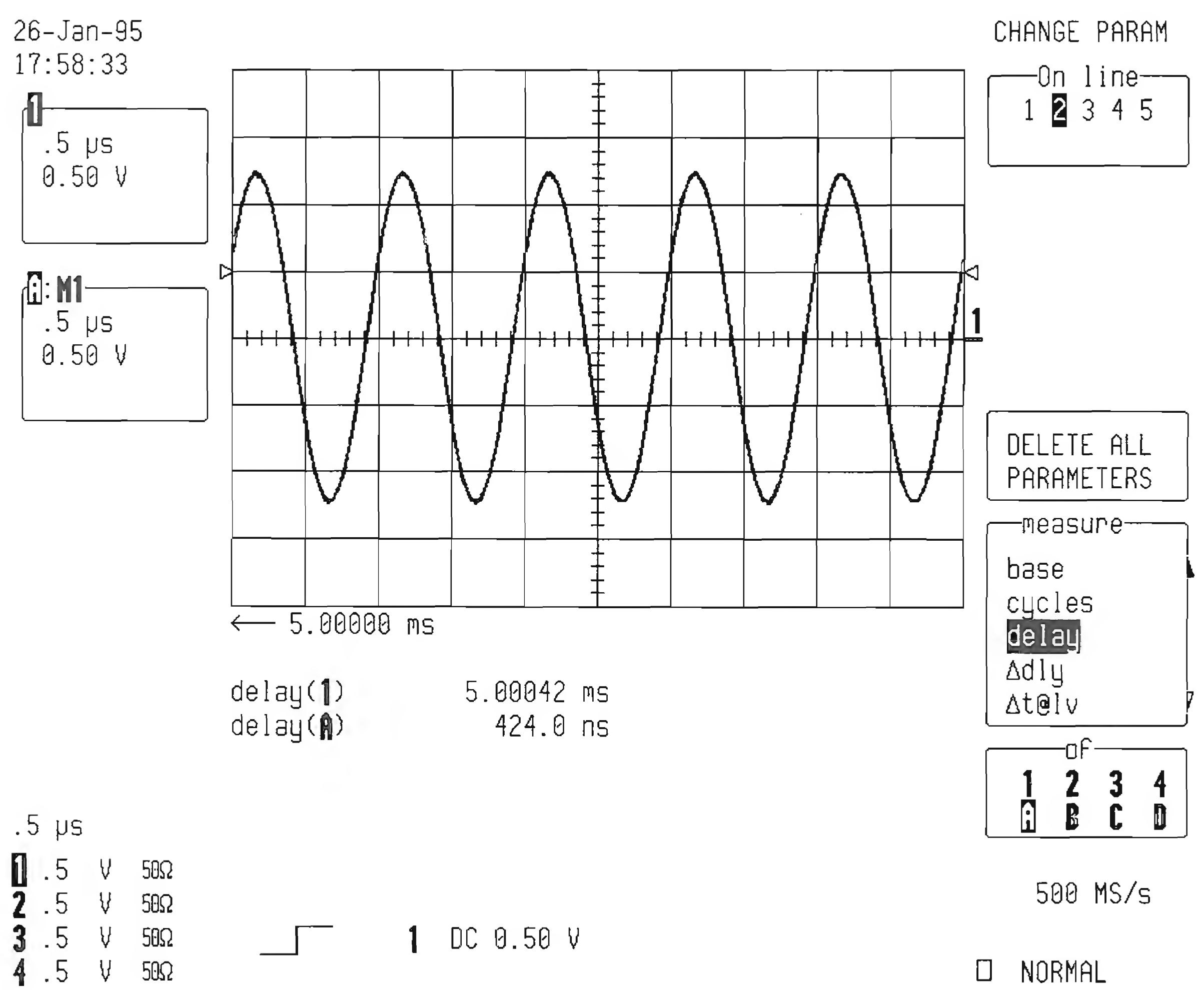
- Recall Memory **1 to A**
- Turn on trace **A**
- Check that the displayed Channel 1 trace is **aligned** with the sine wave from memory 1.

- Press : **Cursors/Measure**
- Measure : **Parameters**
- Mode : **Custom**
- Statistics : **Off**

- Change parameters

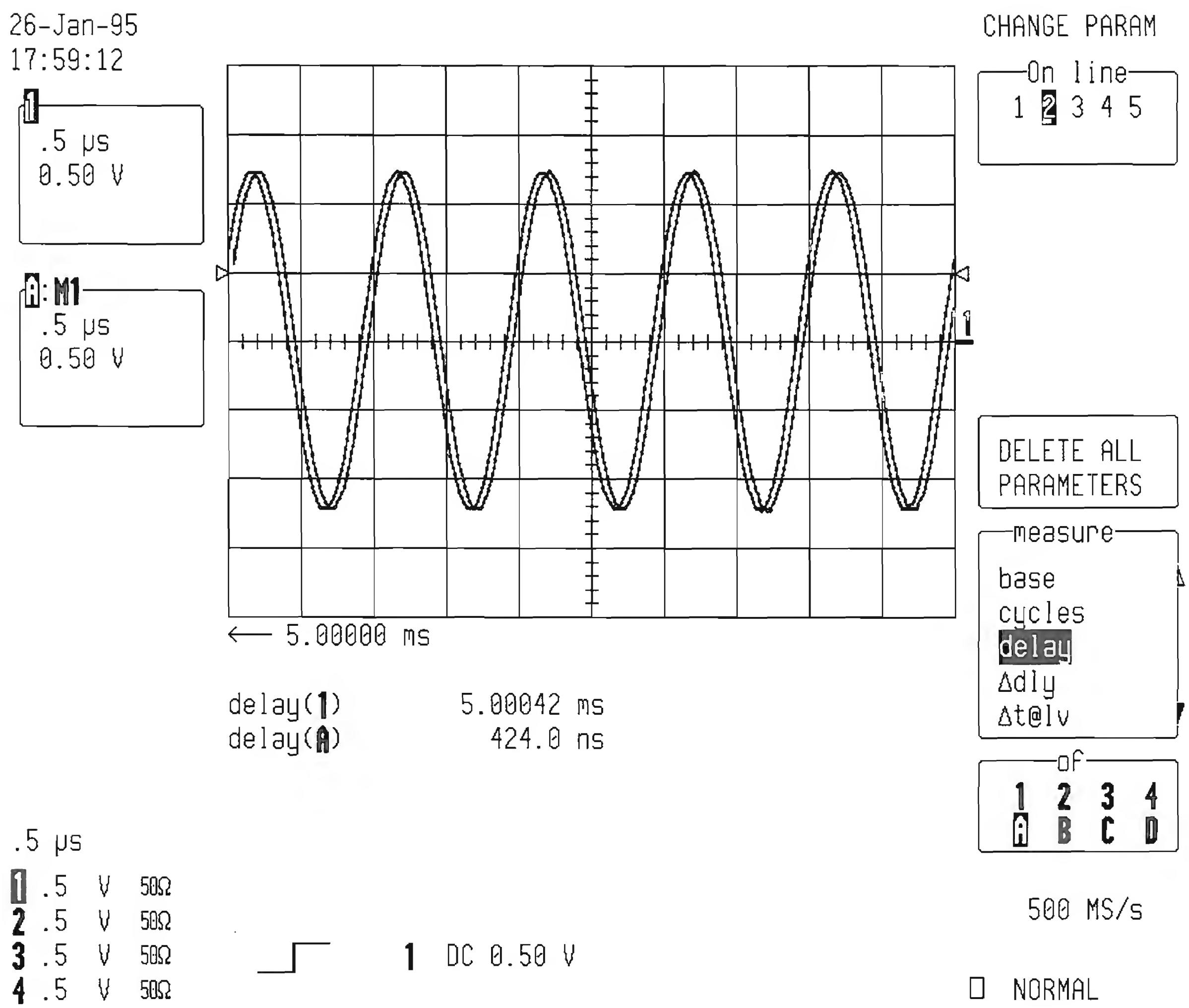
- On line 1 : **Delay of 1**
- On line 2 : **Delay of A**

- Check that (**delay(A) - delay(1) + 5 msec**) ≤ ± **0.00005** msec corresponding to **10ppm.**



A difference of ± **0.05 µsec** corresponds to ± **10 ppm**.

See screen dump below :



5.13 Overshoot and Rise time (10%-90%)

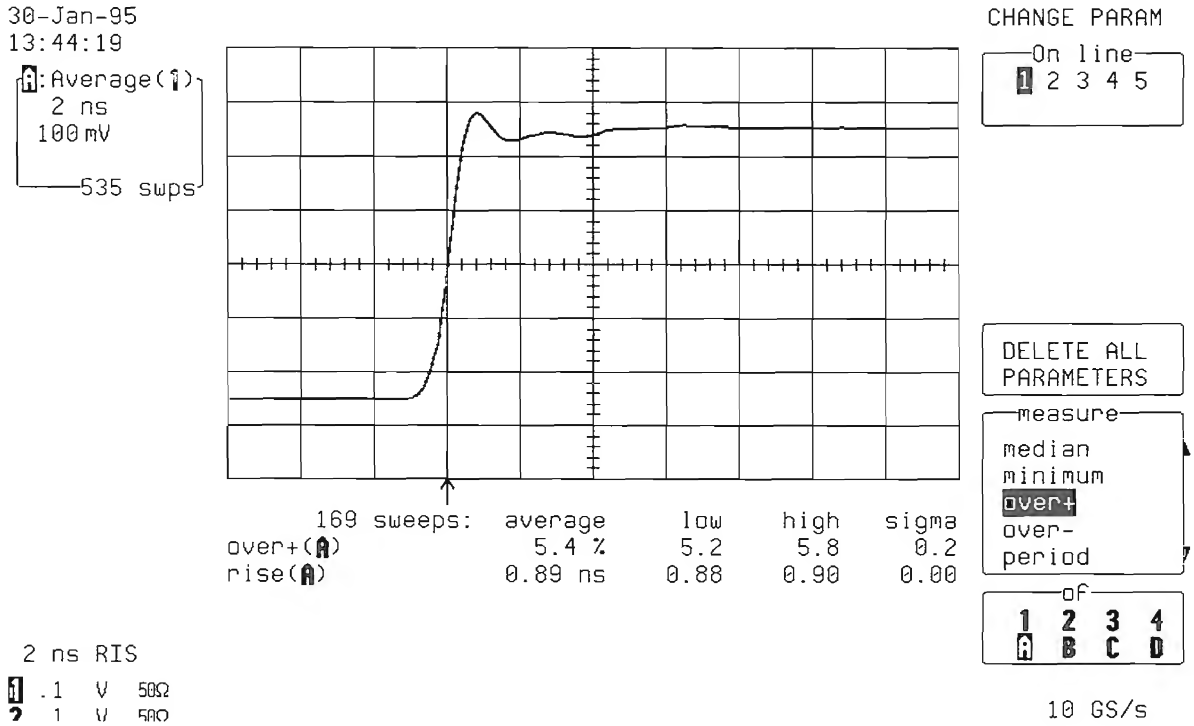
Specifications

DC 50 Ω, 100 mV/div., : overshoot < 12 %, rise time < 0.9 ns
DC 1 MΩ, 100 mV/div., : rise time < 1.5 ns

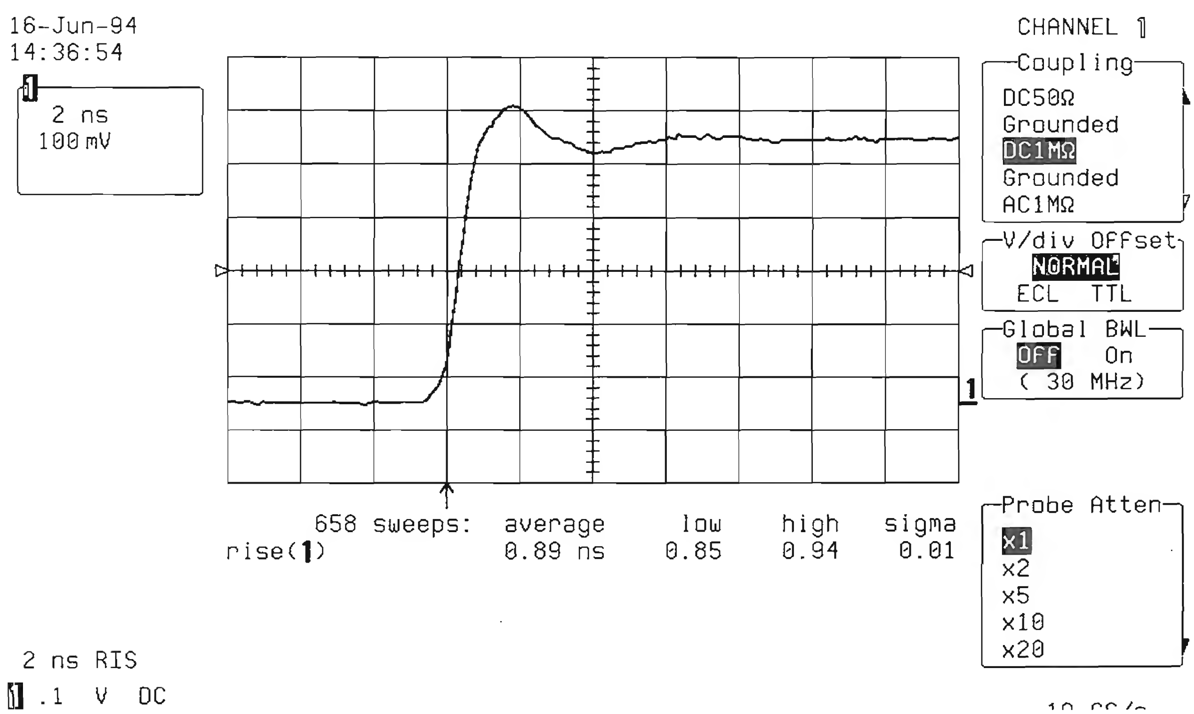
Procedure

- Apply the fast pulse generator LeCroy 4969 (< 500 psec) or equivalent, to Channel 1
- Set the DSO as follows :
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Coupling Channel 1 : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **- 250 mV**
- Input gain : **100 mV/div**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC 250 mV**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Normal**
- Holdoff : **Off**
- Timebase : **2 nsec/div**
- Record up to : **50K samples**
- Delay : **30 % Pre-Trigger**
- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 1000 points**
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- Of : **Channel 1**
- Turn off trace : **Channel 1**
- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**
- Change Parameters :
- on displayed trace : **A**
- On line 1 :
- Measure : **Over + of A**
- On line 2 :
- Measure : **Rise of A**

- After at least 100 sweeps, check that the average overshoot is < **12 %** and rise time is < **0.9 ns (** measured in scope and not corrected for the effect of the step generator).



- Set Input Coupling : **DC 1M Ω**
- Terminate the output of the 4969 pulser with a **50Ω** feed through and connect it to Ch1
- After at least 100 sweeps, check that the Average rise time is < **1.5** ns (measured in scope and not corrected for the effect of the step generator).



- Repeat the above tests for Channel 2, Channel 3 and Channel 4 substituting channel control and input connector, and check as above.

5.14 Probe Calibrator Verification

Specifications

Amplitude : 50 mV to 500 mV ± **2 %** into 50Ω
: 50 mV to 1 V ± **2 %** into 1 MΩ

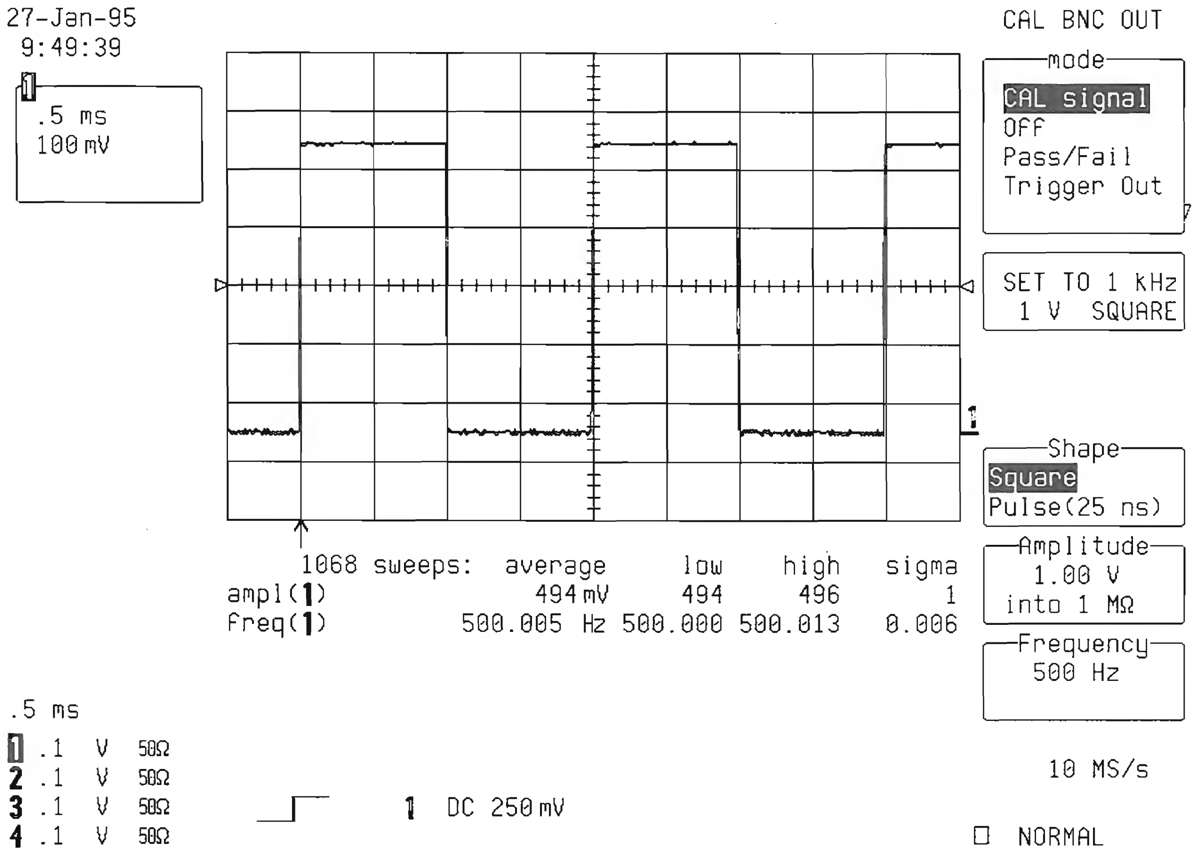
Frequency : 500 Hz to 2 MHz ± 1 ‰

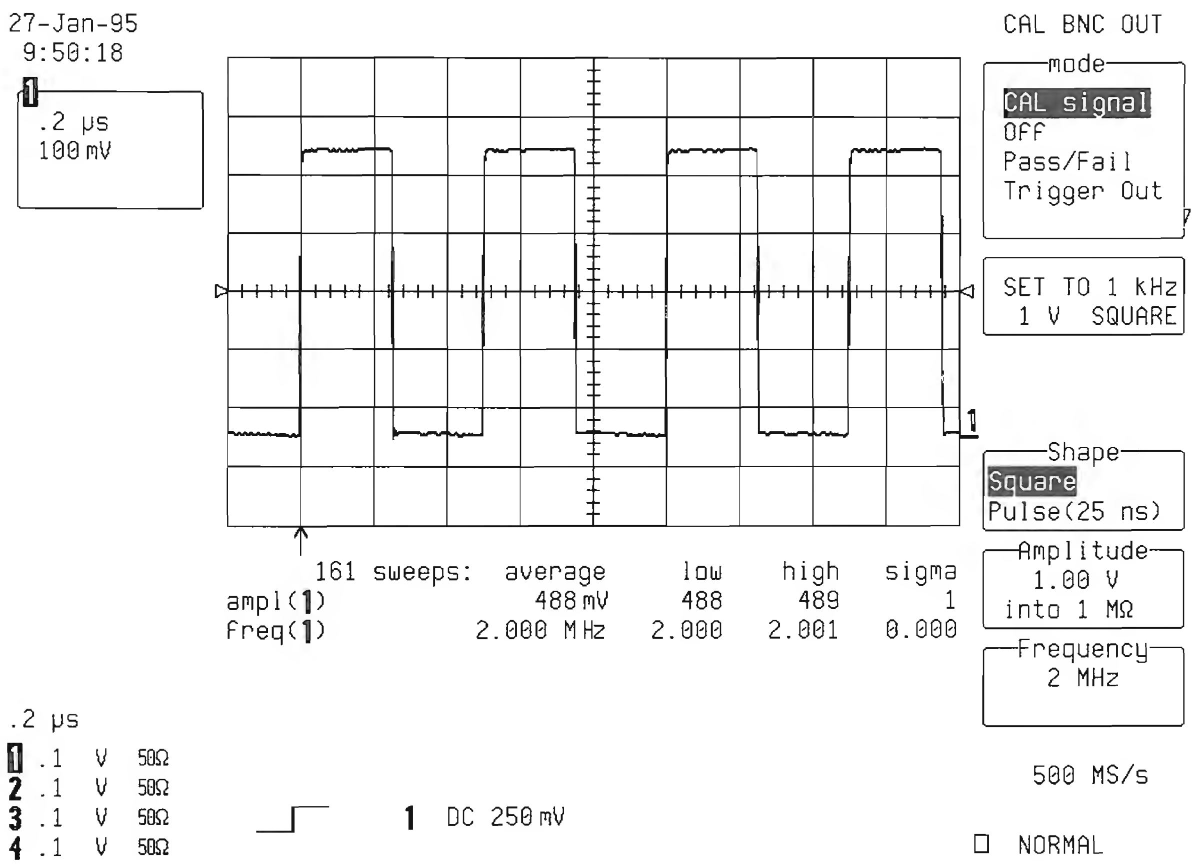
Probe Calibrator Verification Procedure

- Connect the Probe Calibrator output to Channel 1, using a 5 nsec BNC cable
- Select : **Utilities**
- Press : **Cal BNC Setup**
- Mode : **Cal signal**
- Set Frequency : **500 Hz**
- Amplitude : **1 V (500 mV into 50 Ω)**
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Input offset : **- 250 mV**
- Input gain : **100 mV/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC 250 mV**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Normal**
- Holdoff : **Off**
- Timebase : **.5 msec/div.**
- Delay : **10 % Pre-Trigger**
- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Change parameters :
- On line 1 : **Measure ampl of 1**
- On line 2 : **Measure freq of 1**

- Check parameters readout : freq (1) = **500 Hz** ± 1 ‰ , and ampl (1) = **500 mV** ± **6 %** (± **2 %** plus ± 4 % due to the non linearity of the scope)
- Set Cal frequency : **2 MHz**
- Timebase : **.2 µs**
- Check that freq (1) is **2 MHz** ± 1 ‰
- Repeat test for amplitude of **0.05 V** (25 mV into 50 Ω)
- Set Cal amplitude : **50 mV** (25 mV into 50 Ω)
- DSO Input gain : **5 mV/div.**

- Check parameters readout ampl (1) = **25 mV** ± **6 %**

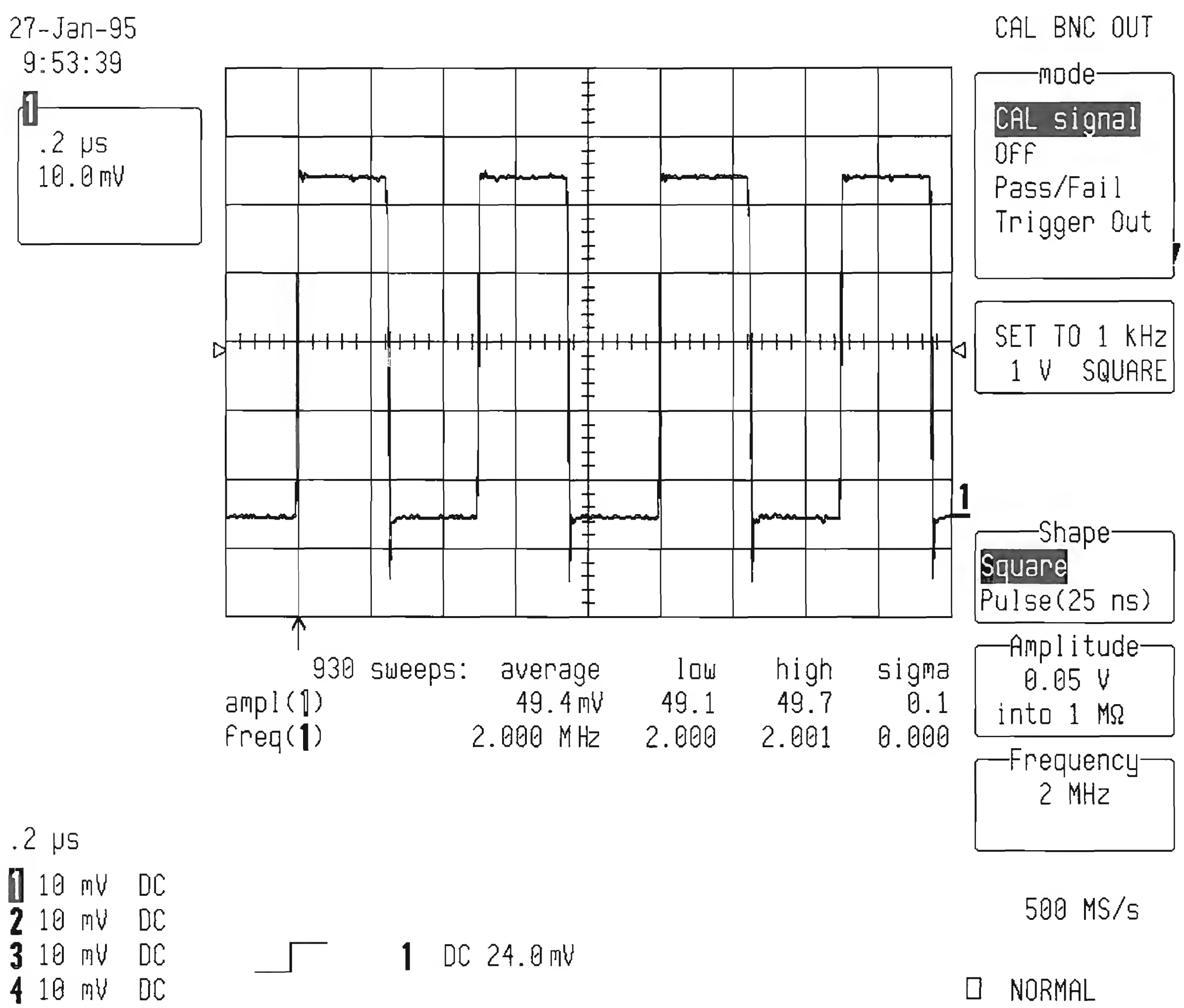

27-Jan-95
9:49:39
.5 ms
100 mV
CAL BNC OUT
mode
CAL signal
Off
Pass/Fail
Trigger Out
SET TO 1 kHz
1 V SQUARE
Shape
Square
Pulse(25 ns)
Amplitude
1.00 V
into 1 MΩ
Frequency
500 Hz
1068 sweeps: average low high sigma
ampl(1) 494 mV 494 496 1
freq(1) 500.005 Hz 500.000 500.013 0.006
.5 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
1 DC 250 mV
10 MS/s
NORMAL


27-Jan-95
9:50:18
.2 μs
100 mV
CAL BNC OUT
mode
CAL signal
Off
Pass/Fail
Trigger Out
SET TO 1 kHz
1 V SQUARE
Shape
Square
Pulse(25 ns)
Amplitude
1.00 V
into 1 MΩ
Frequency
2 MHz
161 sweeps: average low high sigma
ampl(1) 488 mV 488 489 1
freq(1) 2.000 MHz 2.000 2.001 0.000
.2 μs
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
1 DC 250 mV
500 MS/s
NORMAL

- Repeat the tests for the amplitude of 0.05 V and 1 V into 1 MΩ

- Cal amplitude : **50 mV**
- Set Input Coupling : **DC 1M Ω**
- DSO Input gain : **10 mV/div.**

- Check parameters readout ampl (1) = **50 mV ± 6 %**



- Set Cal amplitude : **1 V**
- DSO Input gain : **200 mV/div.**

- Check parameters readout ampl (1) = **1 V ± 6 %**

5.15 Overload

Specifications

1 Watt into 50 Ω : Overload < 17 seconds

Procedure

- Set the DSO as follows :

- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **- 3.5 V**
- Input gain : **1 V/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC - 0.04 V**
- Delay : **zero**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Norm**
- Holdoff : **Off**
- Timebase : **2 sec/div.**
- Channel Use : **4**
- Record up to : **1000 samples**

- From Tektronix power supply PS5004, apply **7.07 V** (1 Watt) to Channel 1.

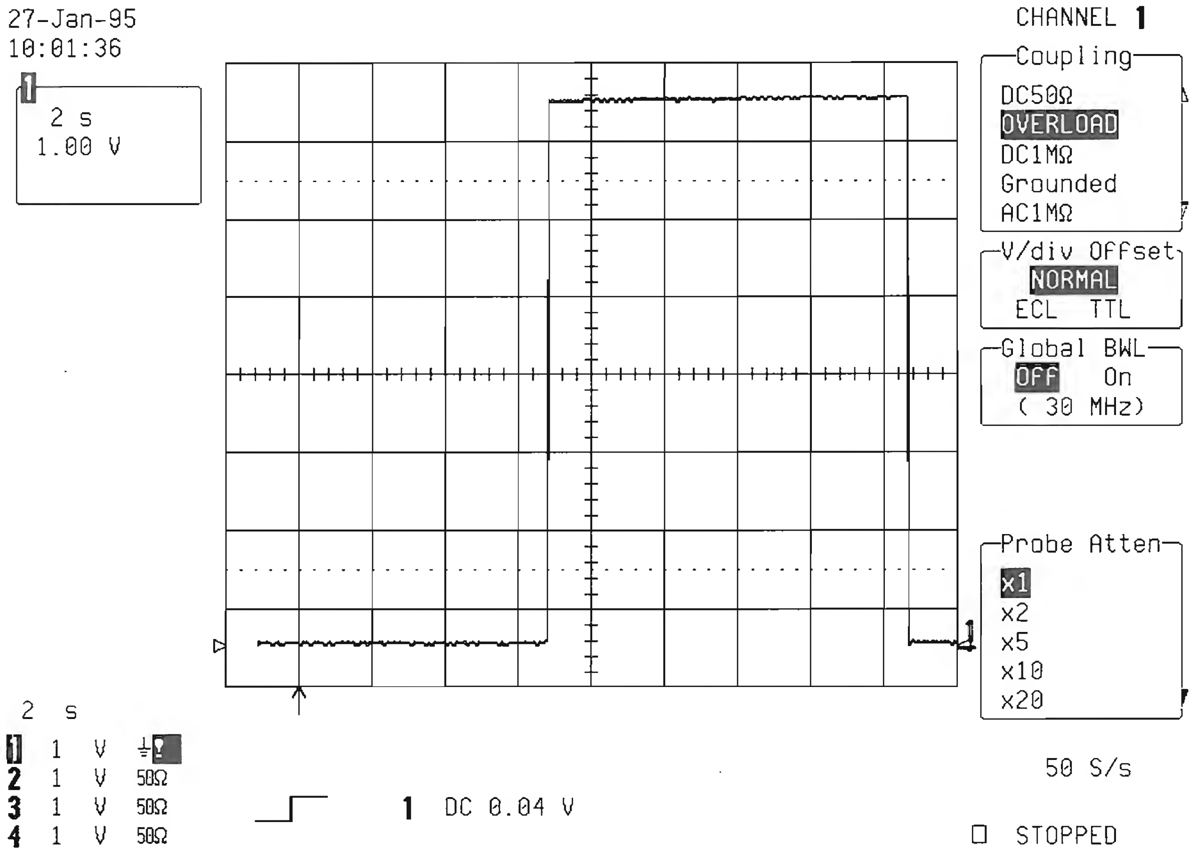
- Check that the overload trips, within **17** seconds.

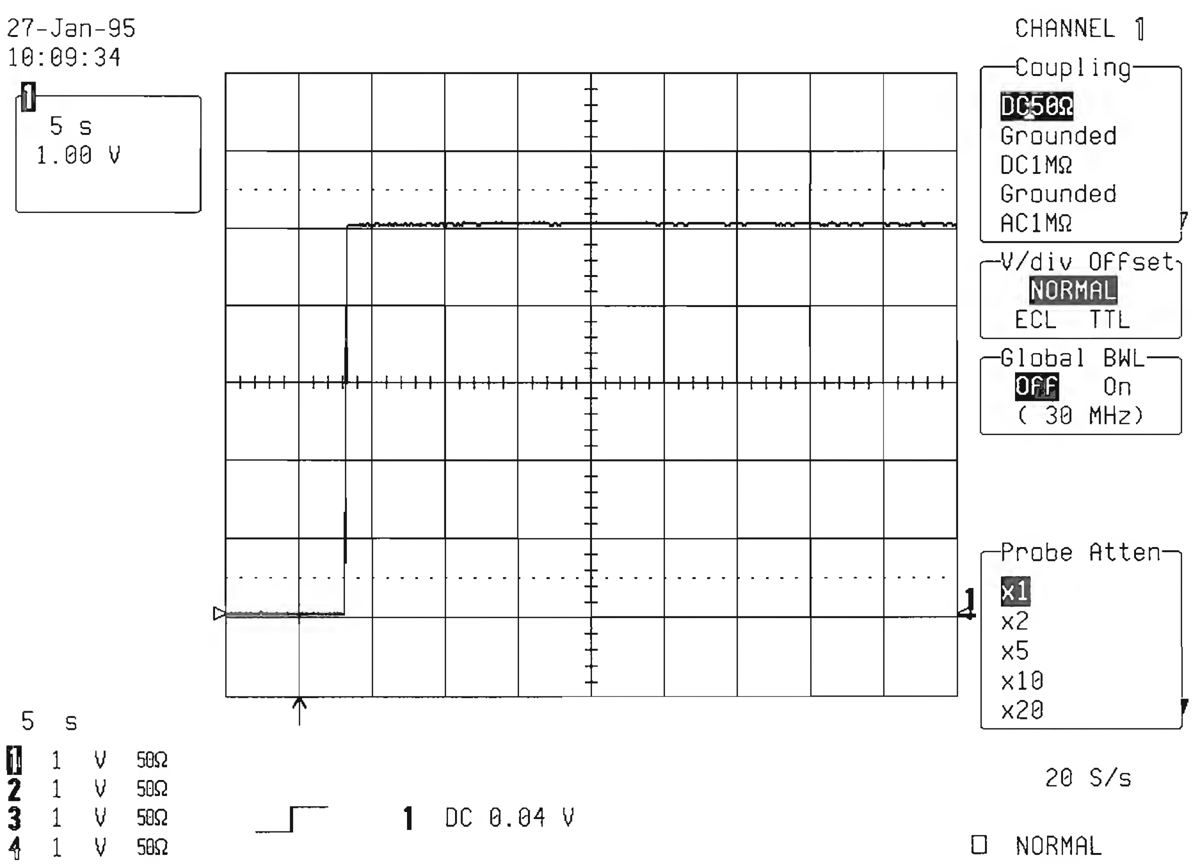
- Set Timebase : **5 sec/div.**

- From Tektronix power supply PS5004, apply **5 V** (.5 Watt) to Channel 1

- Check that the overload doesn't trip for at least **30** seconds.

- Repeat the above tests for Channel 2, Channel 3 and Channel 4 substituting channel controls and input connector, and check as above.


27-Jan-95
10:01:36
1
2 s
1.00 V
CHANNEL 1
Coupling
DC50Ω
OVERLOAD
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
OFF On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
2 s
1 1 V
2 1 V 50Ω
3 1 V 50Ω
4 1 V 50Ω
1 DC 0.04 V
50 S/s
STOPPED


27-Jan-95
10:09:34
1
5 s
1.00 V
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
OFF On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
5 s
1 1 V 50Ω
2 1 V 50Ω
3 1 V 50Ω
4 1 V 50Ω
1 DC 0.04 V
20 S/s
NORMAL

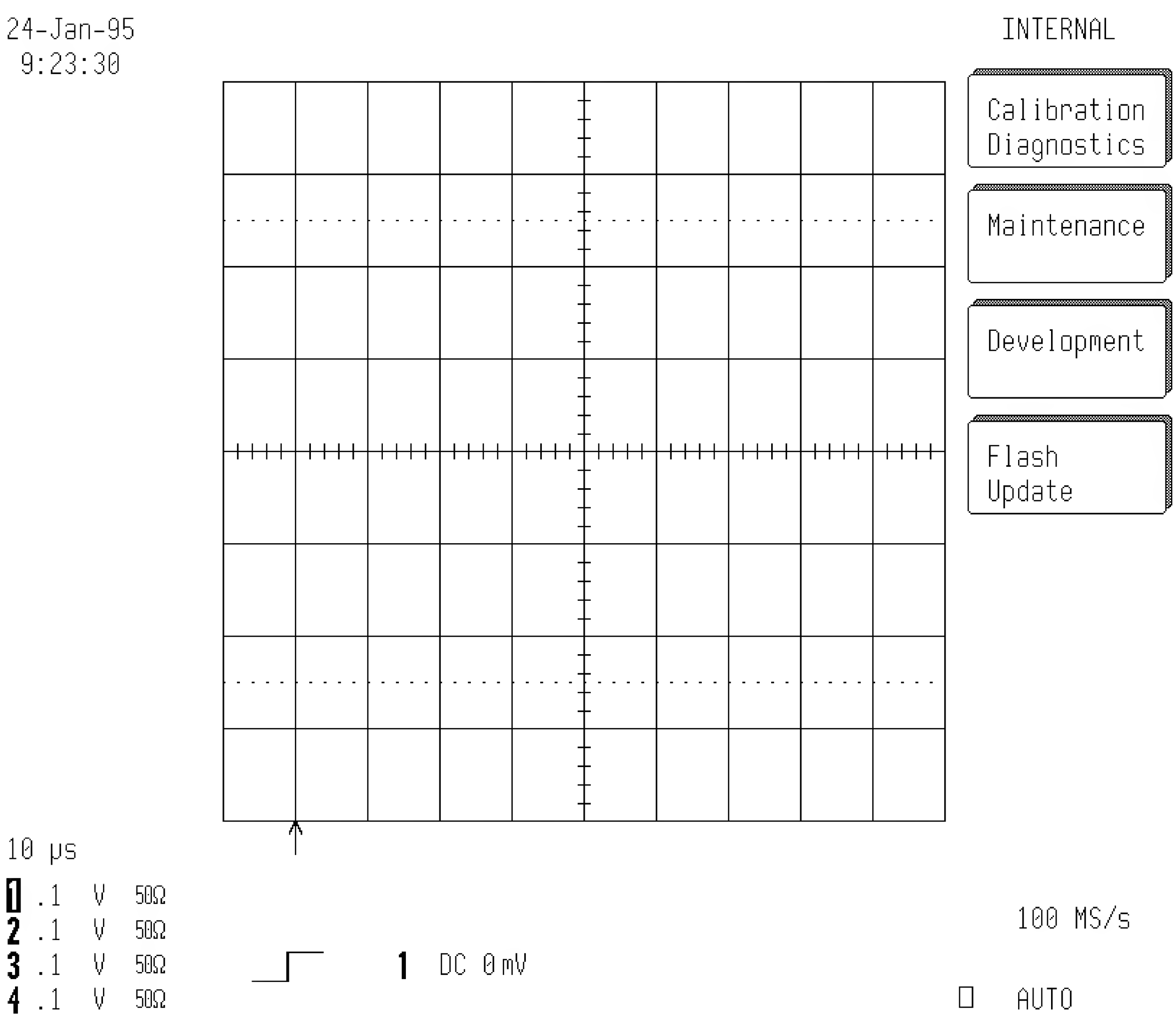
SECTION 6 INTERNAL CALIBRATION and DIAGNOSTICS

6.1 Introduction

- The 9354A/T internal calibration use routines to confirm basic functionality, no test equipment is required to do these test procedures. The **diagnostics menu** is entered by simultaneously depressing the **third** and **fourth** menu push buttons on the right hand side of the CRT and then by depressing the **fifth**.

- To quickly check the performance of the digital storage oscilloscope, select the **calibration diagnostics**.

- Press the **recalibrate completely** button to do a full recalibration of the front end. It is advisable to perform this type of check when the scope is in a stable condition.



6.2 Diagnostic Summary

- Press **diagnostic summary**.
- This is a handy tool to perform a quick but comprehensive **internal performance** check, without touching the acquisition settings. The failures are indicated by channel identifiers.
- If no problem is detected, the fields are left **blank**.

```
24-Jan-95                                                      CALIBRATION
 9:23:50
  30°         Calibration Diagnostic Summary            2.5 ns   Diagnostic
                                                                  Summary
Gain and Offset Calibration:
                          2 mV   5 mV  10 mV  20 mV  50 mV  .1  V
ADC zero reading                                                 Diagnostic
gain measurement                                                  Results
gain is negative
gain control range
offset control range
final gain setting
final offset setting

Trigger Level Calibration:
                          Trigger
                    dc   bwl   hfr    ac                         Diagnostic
control                                                          Measurements
hysteresis
                                                                 Recalibrate
Trigger Interval Counter Calibration:   2.512 [ns]  passed       Completely



Failures are indicated by channel identifiers.  Fields are left
blank if no problem detected or a failure occurred previously.
```

- The **gain** and **offset** calibration results displayed for Channel 1, Channel 2, Channel 3 and Channel 4 are independent of the following conditions:

- Time base
- 50 Ω or 1 MΩ input impedance
- BWL on or off
- Variable gain
- Offset
- Trigger mode and coupling

- The internal calibration is checked at **DC 1 MΩ**, and for the **six gain** settings : 2 mV, 5 mV, 10 mV, 20 mV, 50 mV, .1 V/div.

6.2.1 Gain and Offset Calibration Description

- ADC zero reading : Failed to get 0 reading from ADC for some choice of Vgain, and Cal signal, while varying the Offset
- Gain measurement : Failed to measure Gain, the gain was not what was expected.
- Gain is negative : Measured a negative Gain or broken channel.
- Gain control range : The range of the variable Gain is checked.
- Offset control range : The range of the variable Offset is checked.
- Final gain setting : An error is detected if the variable Gain and fix Gain adjustment do not converge to the desired Gain.
- Final offset setting : An error is detected if the 3 Offset calibration points do not lie on a straight line.

6.2.2 Trigger Level Calibration

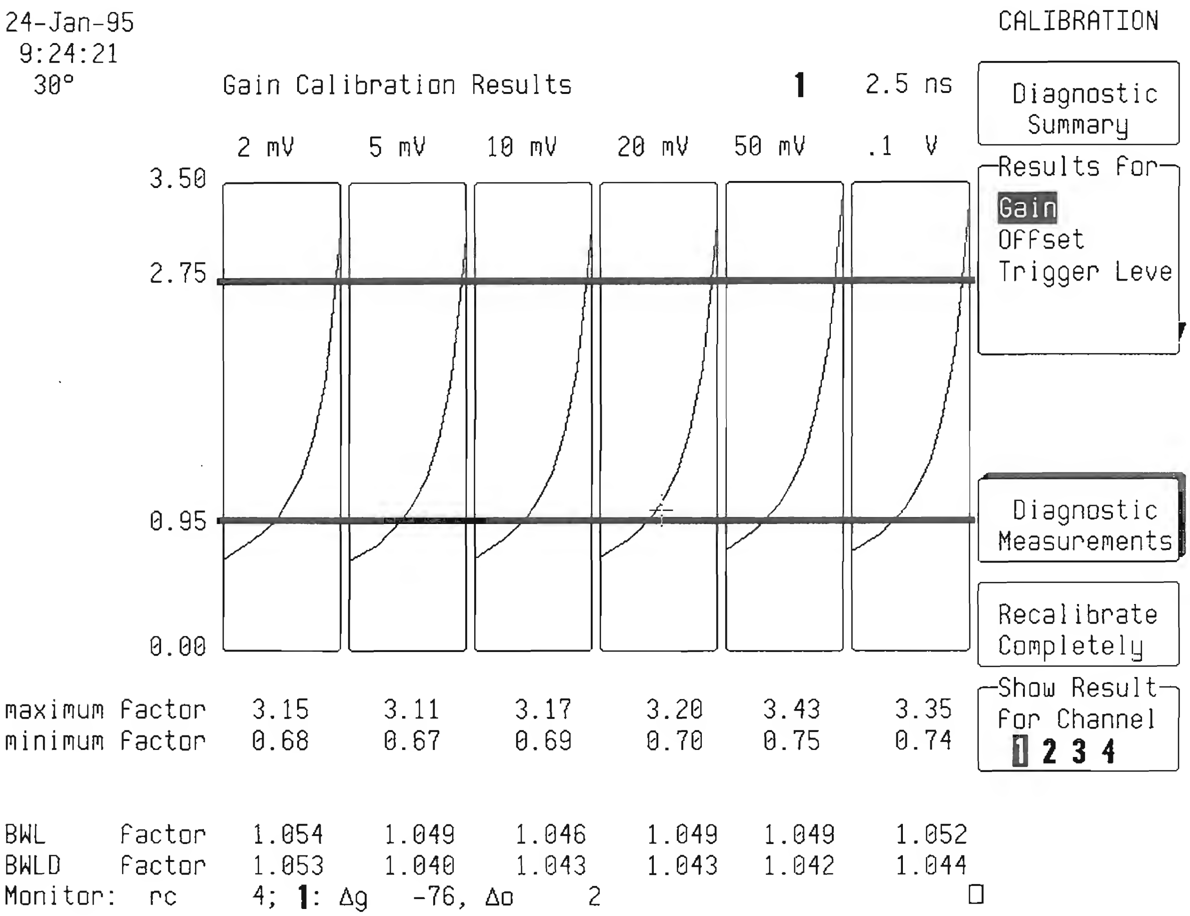
- The control of the trigger hysteresis is done in the trigger mode DC, BWL on, HFr, and AC. If an error has occurred 1, 2, 3, 4 or E is displayed corresponding to Channel 1, Channel 2, Channel 3, Channel 4 or External.
- Control : Failed if no transition of discriminator observed when stepping the Threshold level.
- Hysteresis : Failed to get correct Hysteresis.

6.3 Diagnostic Results

6.3.1 Gain Curves

- Press **diagnostic results**
- Select results for **gain**
- Press **recalibrate completely**
- Select show results for **Channel 1**

- Variable gain range, checked by software must be better than 0.95 to at least 2.75. With regards to the illustration, the lower portion of the curve must extend below **0.95** limit, and the upper portion above the **2.75** limit.
- If this is not true the Gain control range summary shows a violation for Channel 1.
- The maximum and minimum gain factors are displayed.



- Repeat the test for Channel 2, Channel 3 and Channel 4

6.3.2 Offset Curves

- Select results for **Offset**, and show result for **Channel 1**

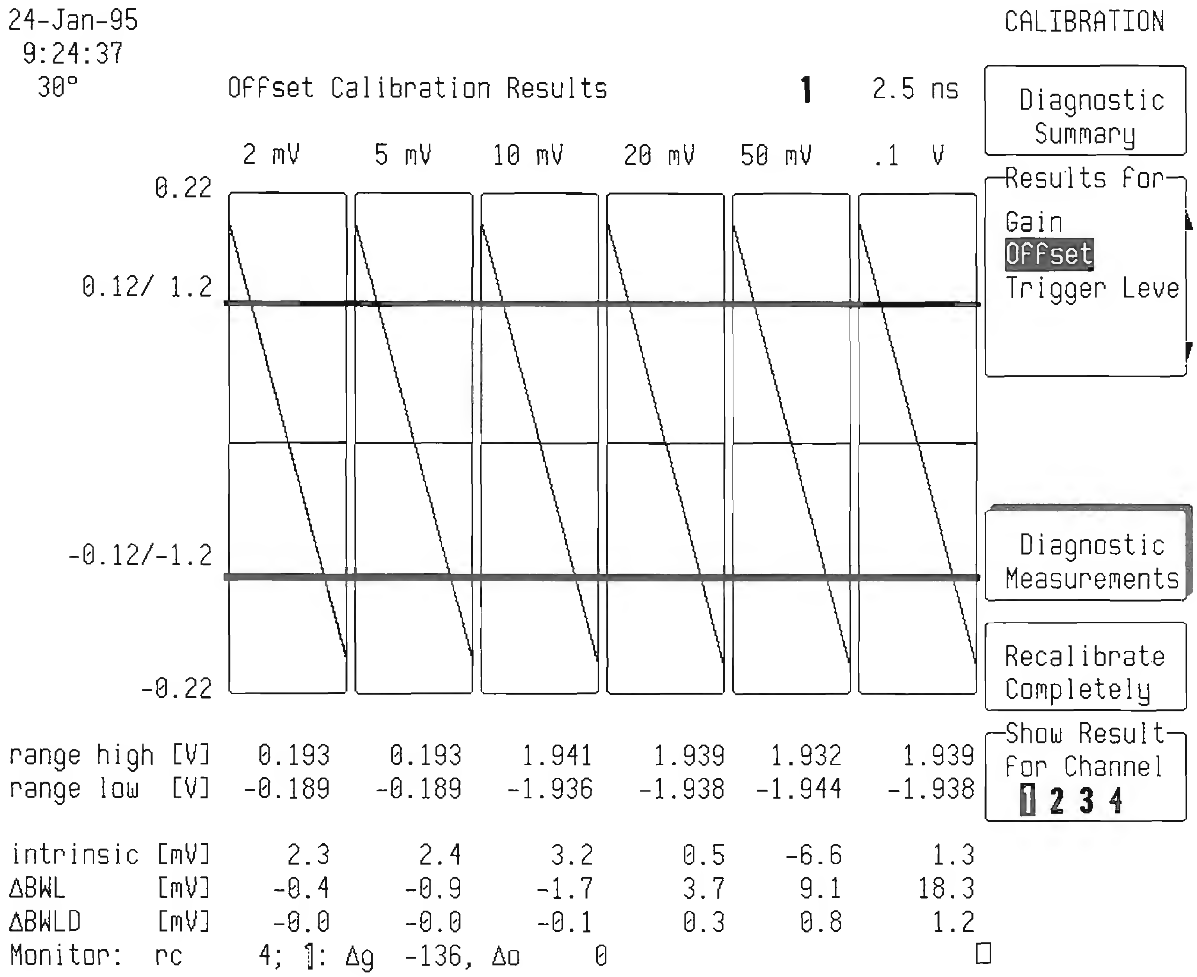
  X = offset DAC range
  Y = offset

- The curves should be above the positive limits + **0.12 V / + 1.2 V** and below the negative limits - **0.12 V / - 1.2 V**.

- For the sensitivities 2 mV, 5 mV/div. a 1/10 attenuator is used, the limits are ± **0.12 V**.
- For the sensitivities 10 mV, 20 mV, 50 mV, 0.1 V/div. the limits are ± **1.2 V**.
- The maximum and minimum offset is ± 1.2 V. The calibration verifies that the DAC can reach this value.

- The intrinsic value represents the offset in mV that should be applied to get zero offset to the ADC.

  NB : ΔBWL is the difference between BWL on and BWL off.



- Repeat the test for Channel 2, Channel 3 and Channel 4.

6.3.3 Trigger Level Calibration

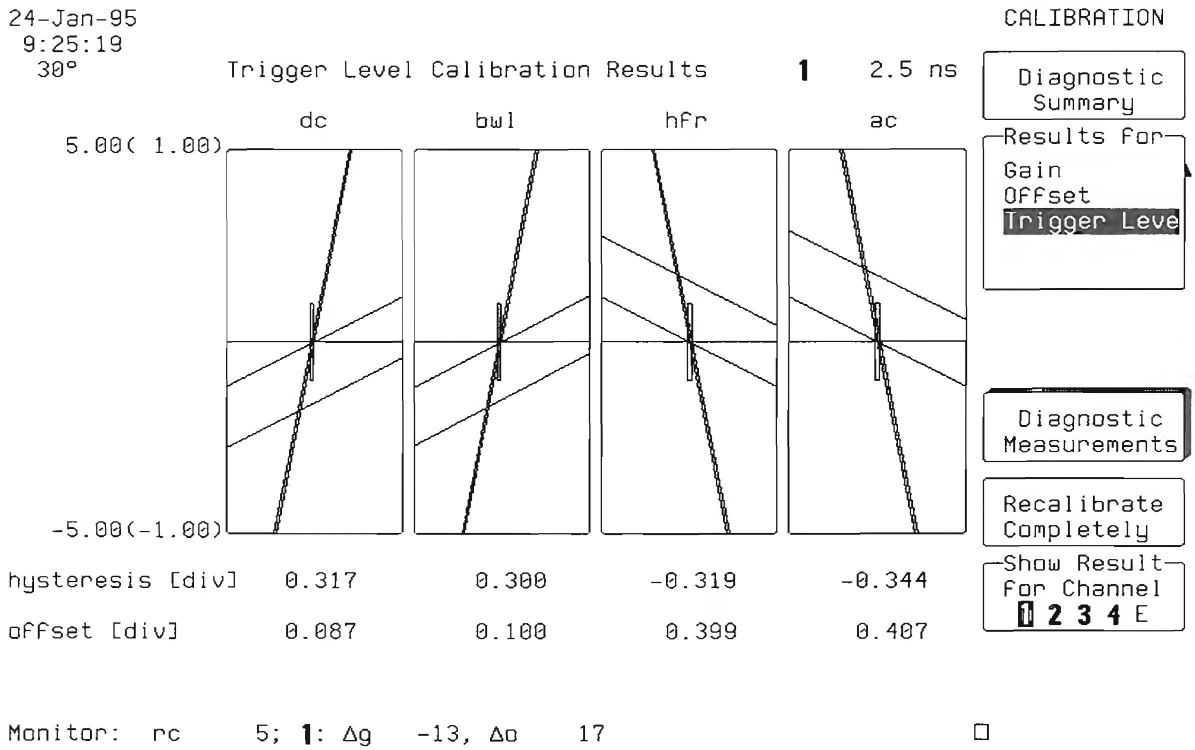
- Select results for **trigger level**

- For Channel 1, Channel 2, Channel 3 and Channel 4 the hysteresis value for trigger DC, BWL, HFR, AC is given in **divisions**. The trigger range is ± 5 div. for the steep curve. The boxed region is zoomed to give the two lines with a vertical scale of ± 1 div. The external trigger hysteresis is given in Volt. The offset of the positive curve relating trigger threshold to DAC setting is given.

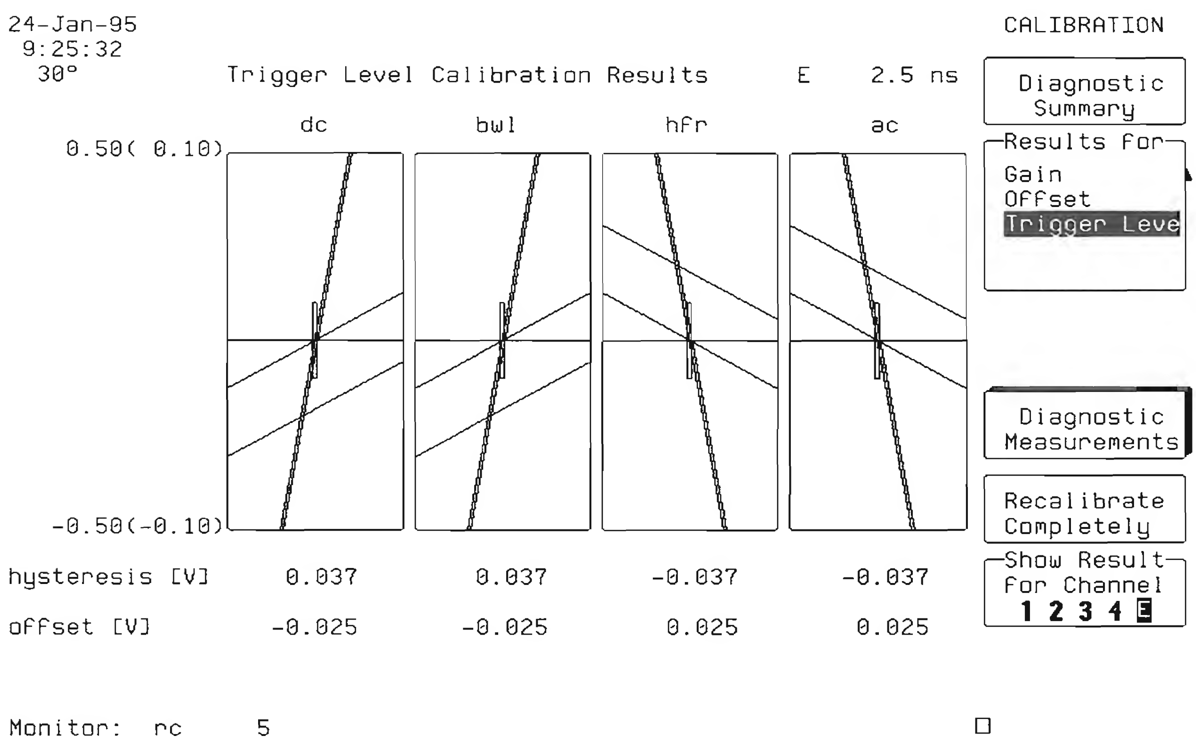
- Press **recalibrate completely**
- Select show result for **Channel 1**

- The **DC** hysteresis in div. should be ± **0.3 div.** ± **0.05 div.**

- Repeat the test for Channel 2, Channel 3 and Channel 4.



- Select show result for **External trigger**
- The hysteresis in Volt should be ± **0.035 V** ± **0.01**



6.3.4 Integral Linearity

- Press **diagnostic measurements**
- Select **Individual Channels**

24-Jan-95
9:27:22
30°

Trigger Level Calibration Results 1 2.5 ns

MEASUREMENTS

Individual Channels

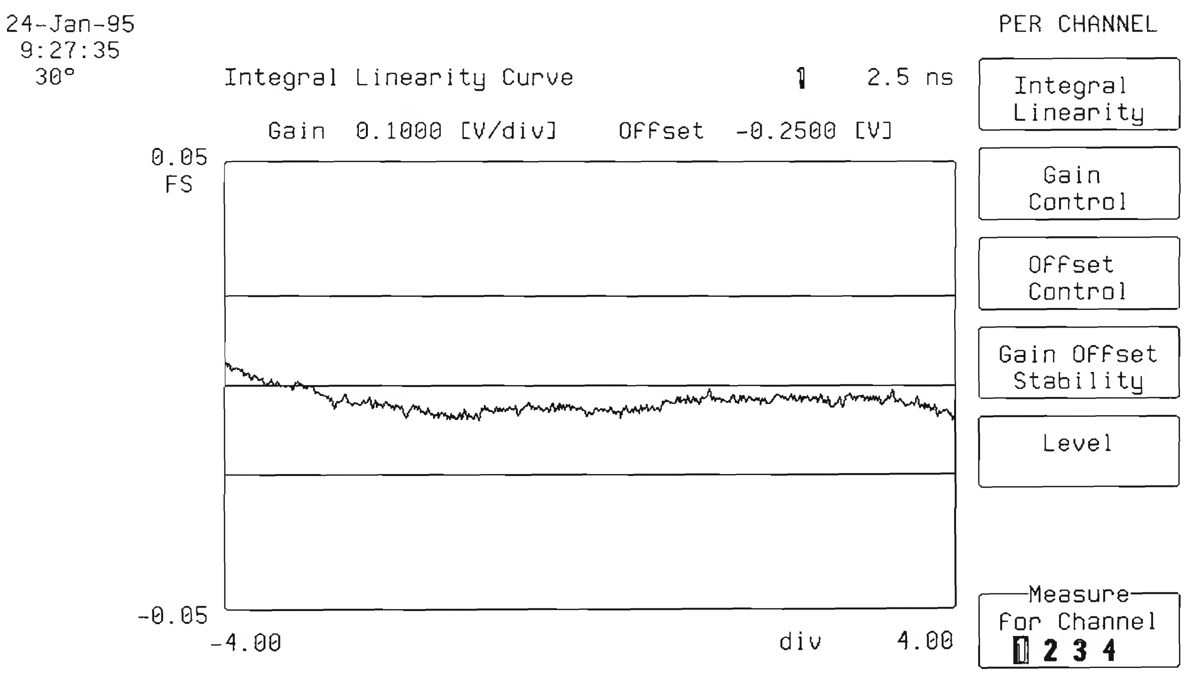
Combined Channels

5.00(1.00)

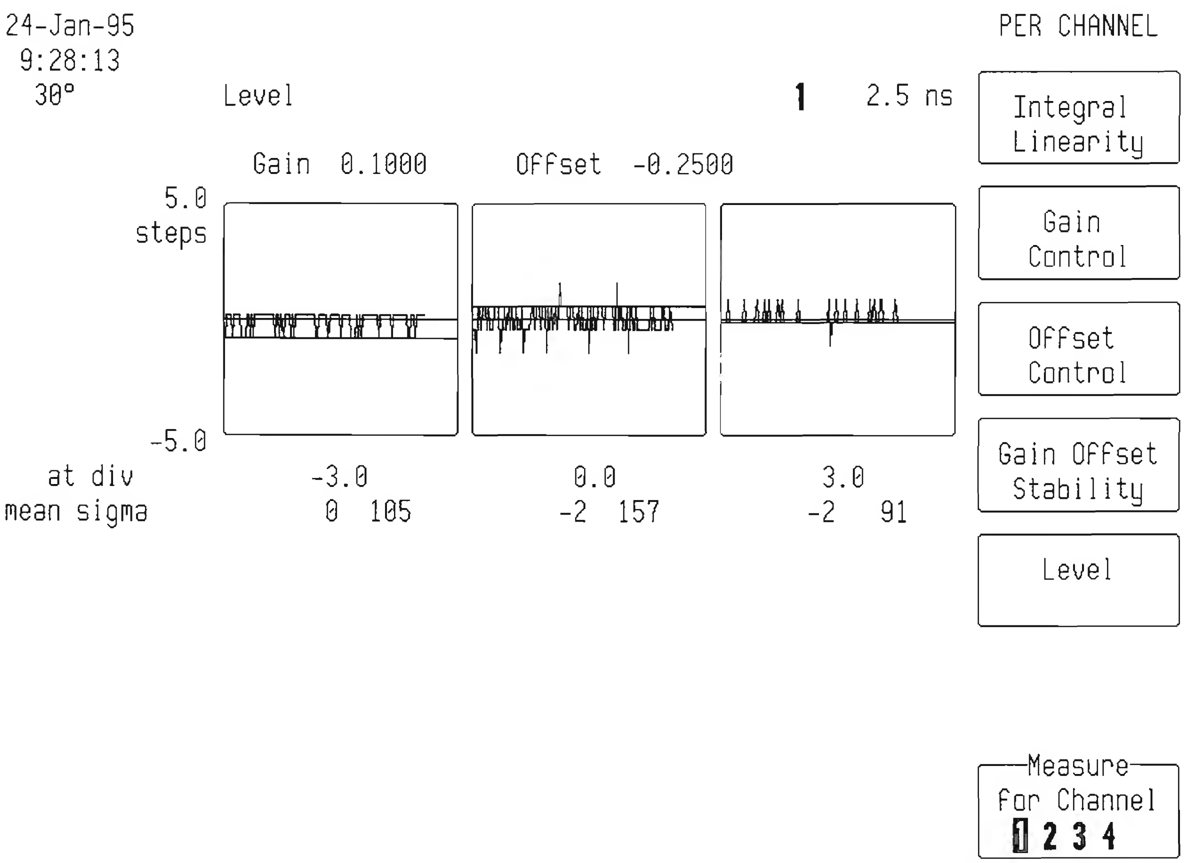
-5.00(-1.00)

	dc	bwl	hfr	ac
hysteresis [div]	0.317	0.300	-0.319	-0.344
offset [div]	0.087	0.100	0.399	0.407

- Select **integral linearity**
- Measure for **Channel 1**



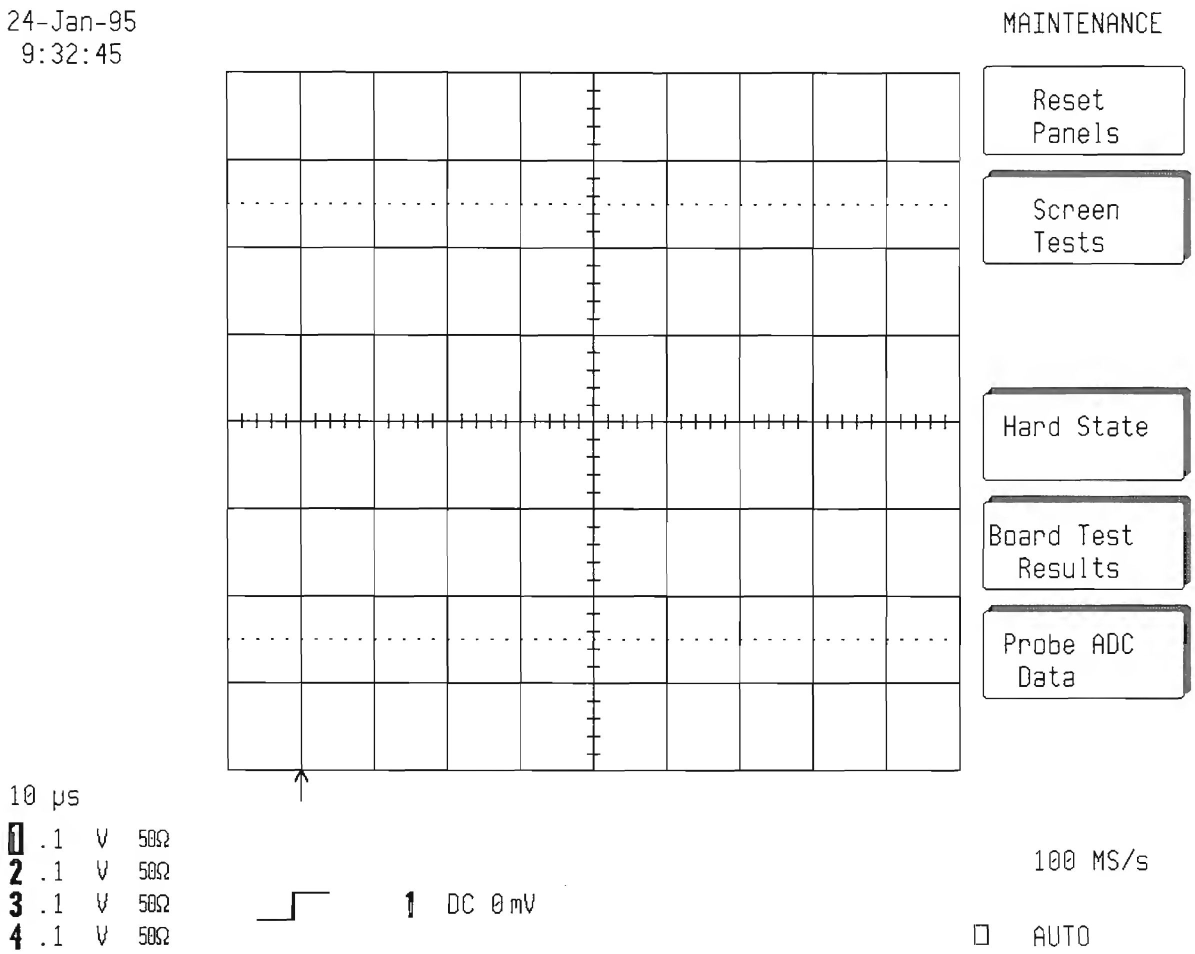
- The integral linearity curve should be within the ± 0.05 * FS bars, for offset = 0.0 V.
- Repeat the test for Channel 2, Channel 3 and Channel 4.
- Press **level**
- Measure for **Channel 1**
- The three plots show raw ADC data displayed around their mean value for 3 different CAL levels.
- The data should be **narrow** and random.
- The theoretical level is shown by the second horizontal line which should be near (< 4 steps) to the measured value for Offset = 0.



- Repeat the test for Channel 2, Channel 3 and Channel 4.

6.4 Board Test Results

- From the Internal menu press **Maintenance**
- Select **Board Test Results**



- This menu displays the board calibration measured at the factory, the calibration values are loaded in the I2C Prom.
- The header block indicates the following information :
- The test version : i.e. 168
- The revision of the printed circuit board : i.e. Rev B
- The engineering change order level : i.e. ECO 1002
- The work order number : i.e. WO 9452-0056
- The tested date : i.e. tested 1995-01-10 it should be : ≥ 1993-xx-xx.

- If the date says 1990-04-01 it is a sign that the I2C prom on the main board can not be read correctly.
- The gain, offset, level, timing, delay values shown in this menu are used to perform the internal calibration of the scope.

```
24-Jan-95                                                    Board Test
 9:33:07

Header:    block lengths 20 32 14 Test version 168  4 chans
       Rev: B, ECO 1002, WO 9452-0056, Tested: 1995-01-10 10:15

CAL levels:  (E68F,-2000mV)  (8015,    0mV)  (199A, 2000mV)
EXT trigger: pos.  (AA78, -410mV)  (56F8,  418mV)
             neg.  (A6C8, -410mV)  (5340,  418mV)
EXT/10 attenuator:    10.004
Delay correction:    20.00 ns

ADC control:  clock period    gain DAC  offset DAC
      2.00 ns  9c  93      2.50 ns  78  7f      5.00 ns  8c  6b
Inter channel delay:      0 ps

ADC control:  clock period    gain DAC  offset DAC
      2.00 ns  9d  91      2.50 ns  85  86      5.00 ns  88  7b
Inter channel delay:      0 ps

ADC control:  clock period    gain DAC  offset DAC
      2.00 ns  96  8a      2.50 ns  7c  81      5.00 ns  80  5f
Inter channel delay:      0 ps

ADC control:  clock period    gain DAC  offset DAC
      2.00 ns  93  87      2.50 ns  7a  7a      5.00 ns  88  65
Inter channel delay:      0 ps
```

6.5 Probe Bus Verification

- From the Internal menu press **Maintenance**
- Select **probe ADC data**
- This menu displays the probe bus and probe ring status.
- With no probe connected to the input, check that the value in the first column is **251 ± 2** for Channel A, B, C, D, and Ext.

```
24-Jan-95                                                        Probe Data
 9:35:01
              value    limits  interrupts
Channel A     252  253 [245,255]     0
Channel B     252  252 [245,255]     0
Channel C     252  252 [245,255]     0
Channel D     252  252 [245,255]     0
Channel EXT   252  252 [245,255]     0
Channel CAL   253  253 [  0,255]     0
Channel MON   125  125 [ 73, 79]     0
Channel T      93   96 [ 90,102]     3     Temperature  30°C
```

- Connect a **AP020** LeCroy active probe to Channel 1 and check that:
- The probe is identified on physical **Channel A**
- The Channel A value indicates in the first column has changed to **21** ± **2**
- An **interrupt** has been detected on Channel A

```
24-Jan-95                                                        Probe Data
 9:36:19
              value    limits  interrupts
Channel A      21   21 [  6, 26]     1     AP020
    01 08 00 41 50 30 32 30 04 06  93 25 01 59 11 06 41 20 00 00
    15 06 3d cc cc cd 21 0a 40 19  ec da 38 99 f3 9d 22 0b c0 00
    00 00 40 00 00 00 01 24 07 01  46 42 01 00 34 06 00 10 00 42
    36 04 02 04 41 06 32 04 48 f5  ff
Channel B     252  252 [245,255]     0
Channel C     252  252 [245,255]     0
Channel D     252  252 [245,255]     0
Channel EXT   252  252 [245,255]     0
Channel CAL   253  253 [  0,255]     0
Channel MON   125  125 [ 73, 79]     0
Channel T      93   96 [ 90,102]     3     Temperature  30°C
```

- Repeat the test for Channel 2, Channel 3, Channel 4 and External Trigger.
- Check that the probe is identified on physical Channel B, C, D, or Ext.
- Connect a LeCroy passive probe with probe ring i.e. **PP002** to Channel 1 and check that :
- The probe **X10** is identified on physical Channel A
- The Channel A value indicates in the first column has changed to **195** ± **2**
- An **interrupt** has been detected on A

```
24-Jan-95                                                   Probe Data
 9:37:48
             value    limits  interrupts
Channel A    195  194 [173,204]    7    x10
Channel B    252  252 [245,255]    0
Channel C    252  252 [245,255]    0
Channel D    252  252 [245,255]    0
Channel EXT  252  252 [245,255]    0
Channel CAL  253  253 [  0,255]    0
Channel MON  125  125 [ 73, 79]    0
Channel T     93   96 [ 90,102]    3    Temperature  30°C
```

- Repeat the test for Channel 2, Channel 3, Channel 4 and External Trigger.
- Check that the probe is identified on physical Channel B, C, D, or Ext.

```
24-Jan-95                                                   Probe Data
 9:38:54
             value    limits  interrupts
Channel A    252  252 [242,255]   12
Channel B    252  252 [245,255]    0
Channel C    252  252 [245,255]    0
Channel D    252  252 [245,255]    0
Channel EXT  195  193 [173,204]    1    x10
Channel CAL  253  253 [  0,255]    0
Channel MON  125  125 [ 73, 79]    0
Channel T     93   96 [ 90,102]    3    Temperature  30°C
```

- Connect a LeCroy passive probe with probe ring **PP012** to Channel 1 and check that :
- The probe **X100** is identified on physical Channel A
- The Channel A value indicates in the first column has changed to **165** ± **2**
- An **interrupt** has been detected on A

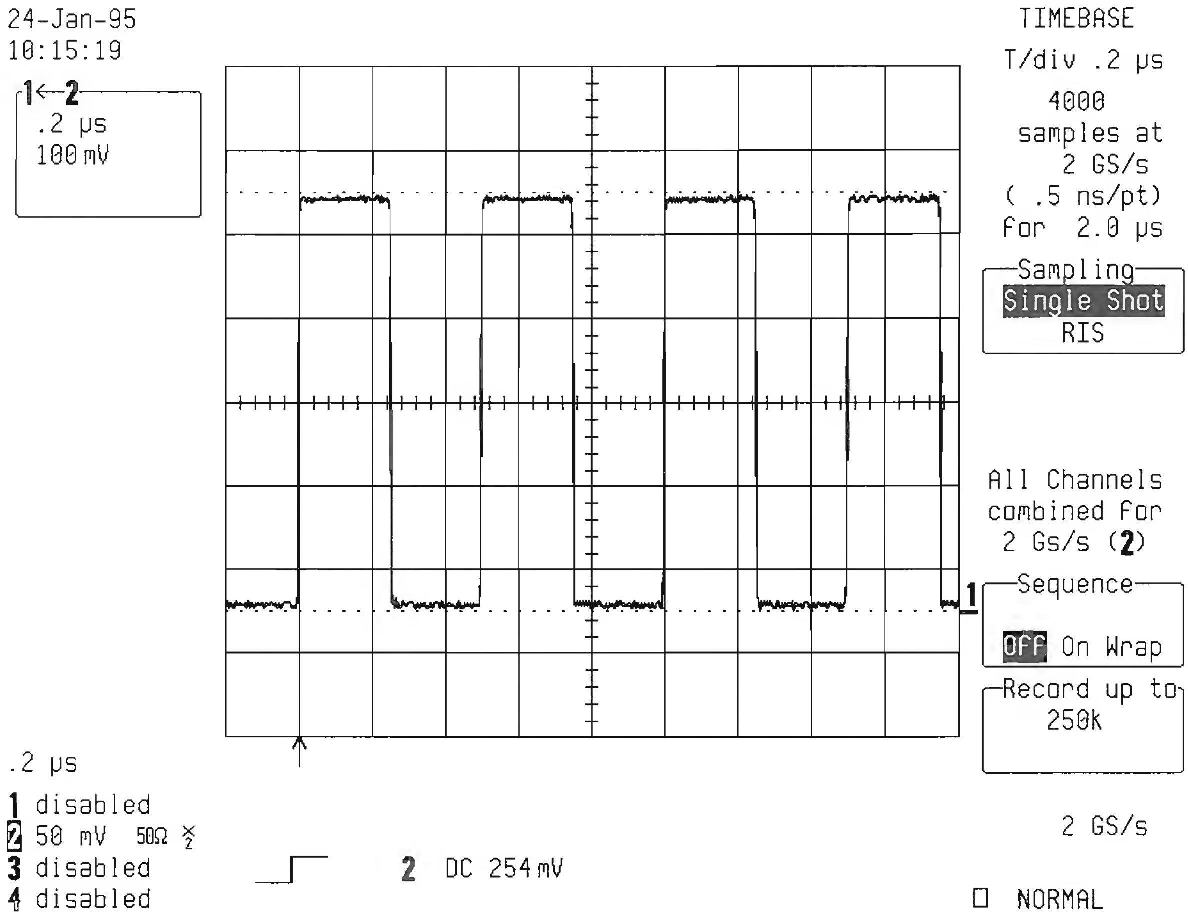
```
24-Jan-95                                                      Probe Data
 9:38:15
              value    limits  interrupts
Channel A     165  165 [140,167]    10    x100
Channel B     252  252 [245,255]     0
Channel C     252  252 [245,255]     0
Channel D     252  252 [245,255]     0
Channel EXT   252  252 [245,255]     0
Channel CAL   253  253 [  0,255]     0
Channel MON   125  125 [ 73, 79]     0
Channel T      93   96 [ 90,102]     3    Temperature  30°C
```

- Repeat the test for Channel 2, Channel 3, Channel 4 and External Trigger.
- Check that the probe is identified on physical Channel B, C, D, or Ext.

6.6 PP092 Verification

Channels can be combined to achieve more memory and more sampling rate by interleaving the ADC's in time. It is possible to achieve 2 GS/s and up to 8M record length (9354AL) by means of a special adaptor call PP092.

- Connect the **PP092** adaptor to Channel 2 and Channel 3 and check that :
- The PP092 is identified on **Channel 2**
- Channel 1, Channel 3 and Channel 4 are **disabled**
- Channel 2 is set to **DC 50 Ω, X2**
- Sampling rate is **2 GS/s**
- Connect the **Probe calibrator** output to **PP092** input using a 5 nsec BNC cable.
- Set Cal frequency to **2 MHz** and Amplitude to **1 V** into **1 MΩ**
- Turn on **trace 2** and check that :



- A Square wave of 500 mV is displayed on Channel 2
- Turn on trace **1**, **3**, **4** and check that :
- A Square wave of 500 mV is displayed on Channel 1, Channel 3, and Channel 4.

SECTION 7 MAINTENANCE

7.1 Introduction

This section contains information necessary to disassemble, assemble, maintain, calibrate and troubleshoot the LeCroy 9354A, 9354AM, 9354AL, 9354T and 9354TM digital oscilloscope.

7.2 Disassembly and Assembly Procedure

The disassembly and assembly procedures detailed below refer to the assembly and disassembly diagram 7.2.3, and the view of figures 7.1, 7.2, 7.3, 7.4, 7.5 & 7.6. Please study the diagram and figures before attempting disassembly.

WARNING

Before removing any parts from the LeCroy 9354A/T, be sure to read carefully the instructions referring to those parts, noting any precautions needed to avoid problems caused by mechanical behaviour, high voltage supplies, etc.

CAUTION

The usual precautions against static electricity are required (see 1.10)

7.2.1 Removal of the Upper Cover (5.9)

The top cover (5.9) is secured by two M4x5 screws (5.11) on both sides of the front panel assembly (2), and by two M4x8 screws (5.10) on the rear panel (3). Remove the screws and carefully slide the cover off the unit to the rear. Removal of the top cover gives access to the boards and parts listed in section 7.2.3.

7.2.2 Removal of the PS9351 Power Supply (4)

WARNING

Ensure the line cord is disconnected. Remove the following:

- Top cover (7.2.1).
- One M4X8 screw (5.7) from left side of the bottom cover (1.1).
- Two M4X8 screws (5.1) from left side of the rear panel (3).

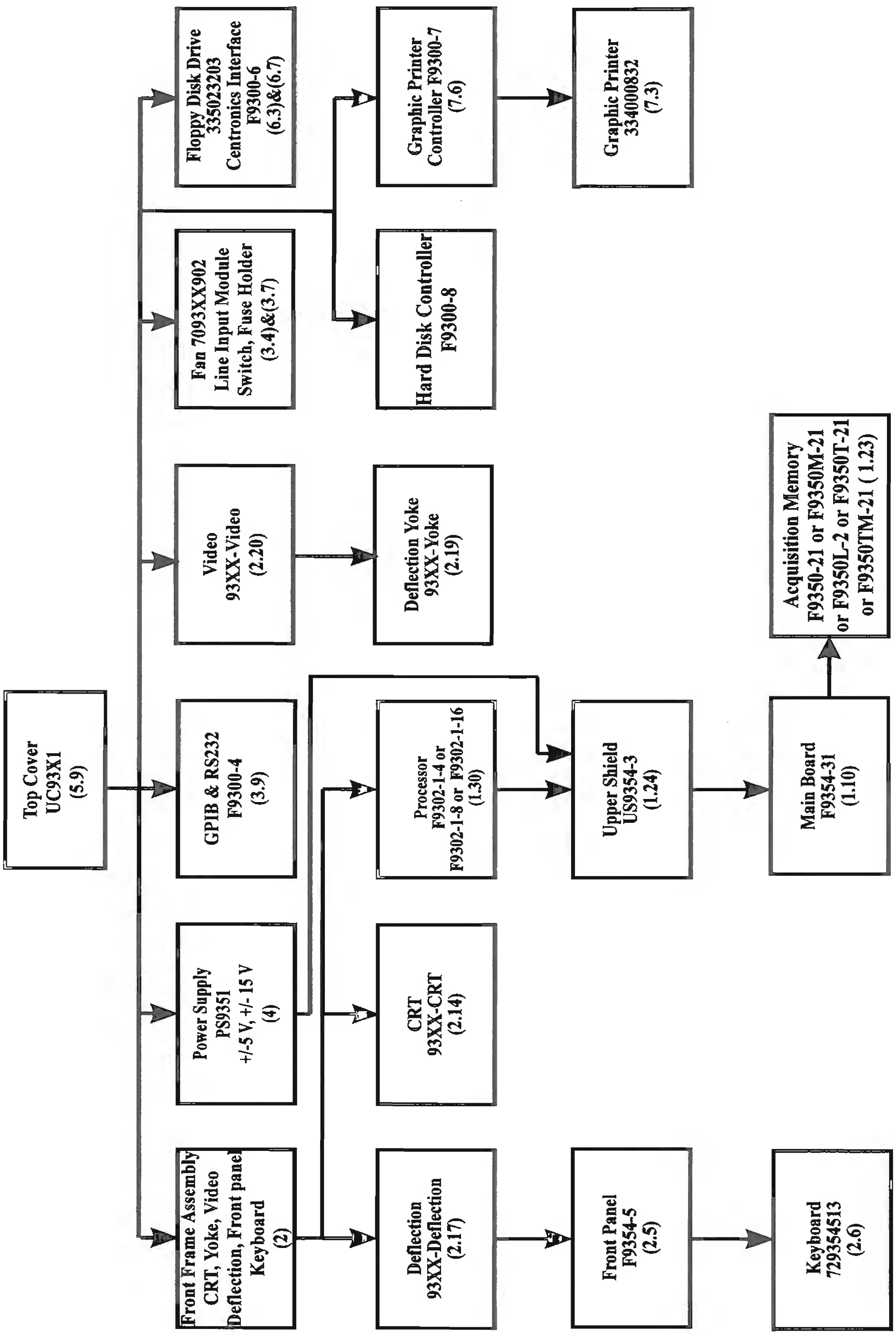
Disconnect the following:

- Base card power cable from main board connector J1/J2 (see figure 7.7).
- PS9351 line input cable (AC line, neutral, ground) from line input module (3.7) .
- Auxiliary power cable from optional internal graphic printer connector J4 (see figure 7.7).

The power supply can now be removed vertically from the oscilloscope.

7.2.3 Disassembly and Assembly Diagram

Disassembly : If it becomes necessary to replace a board or a part, use the disassembly diagram to disassemble the unit. Any board can be removed if items higher in the diagram and connected by a line are already out.



Assembly : Reassemble the unit in the reverse order.

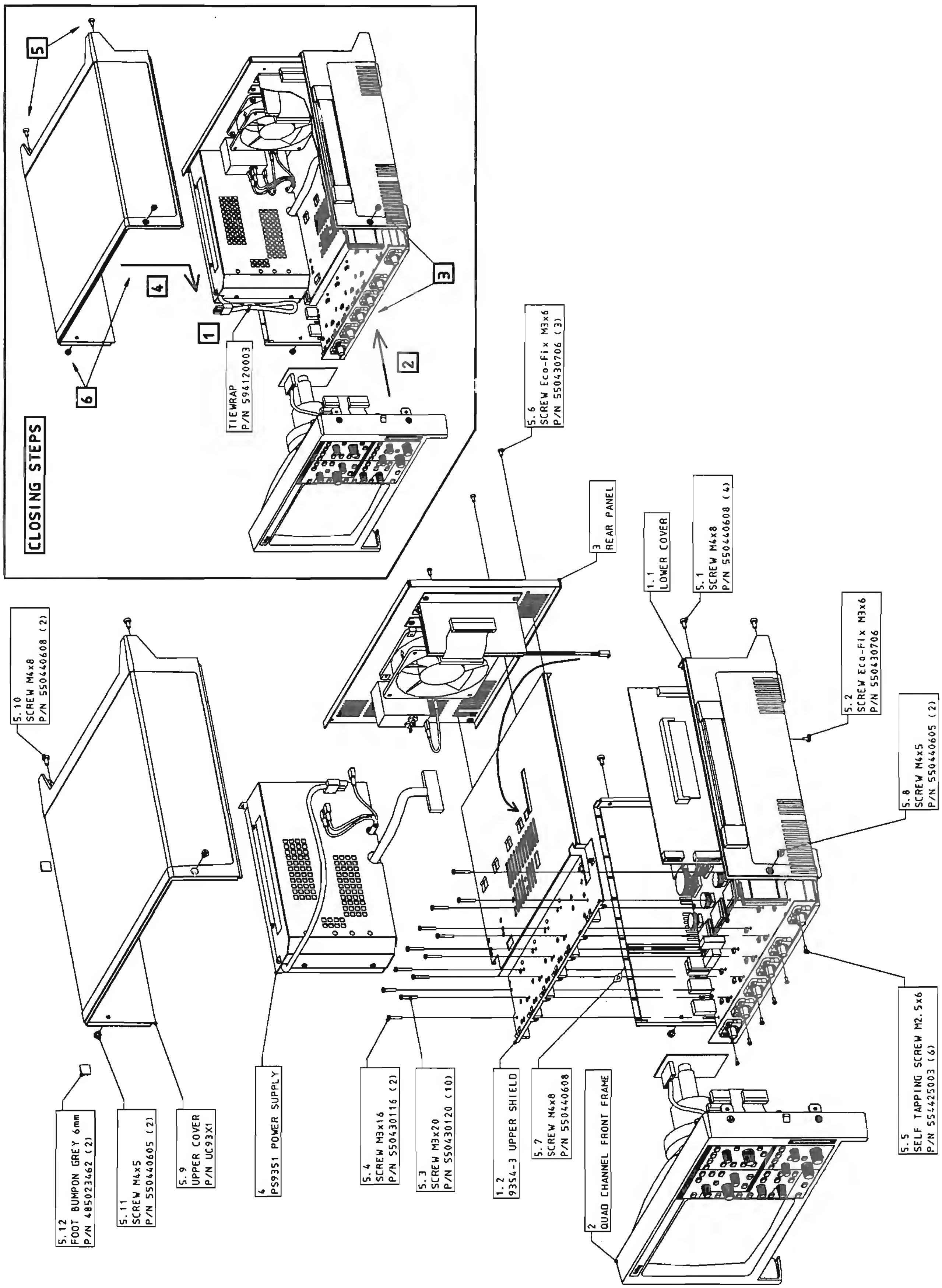


Figure 7.1 : 9354A/T Assembly

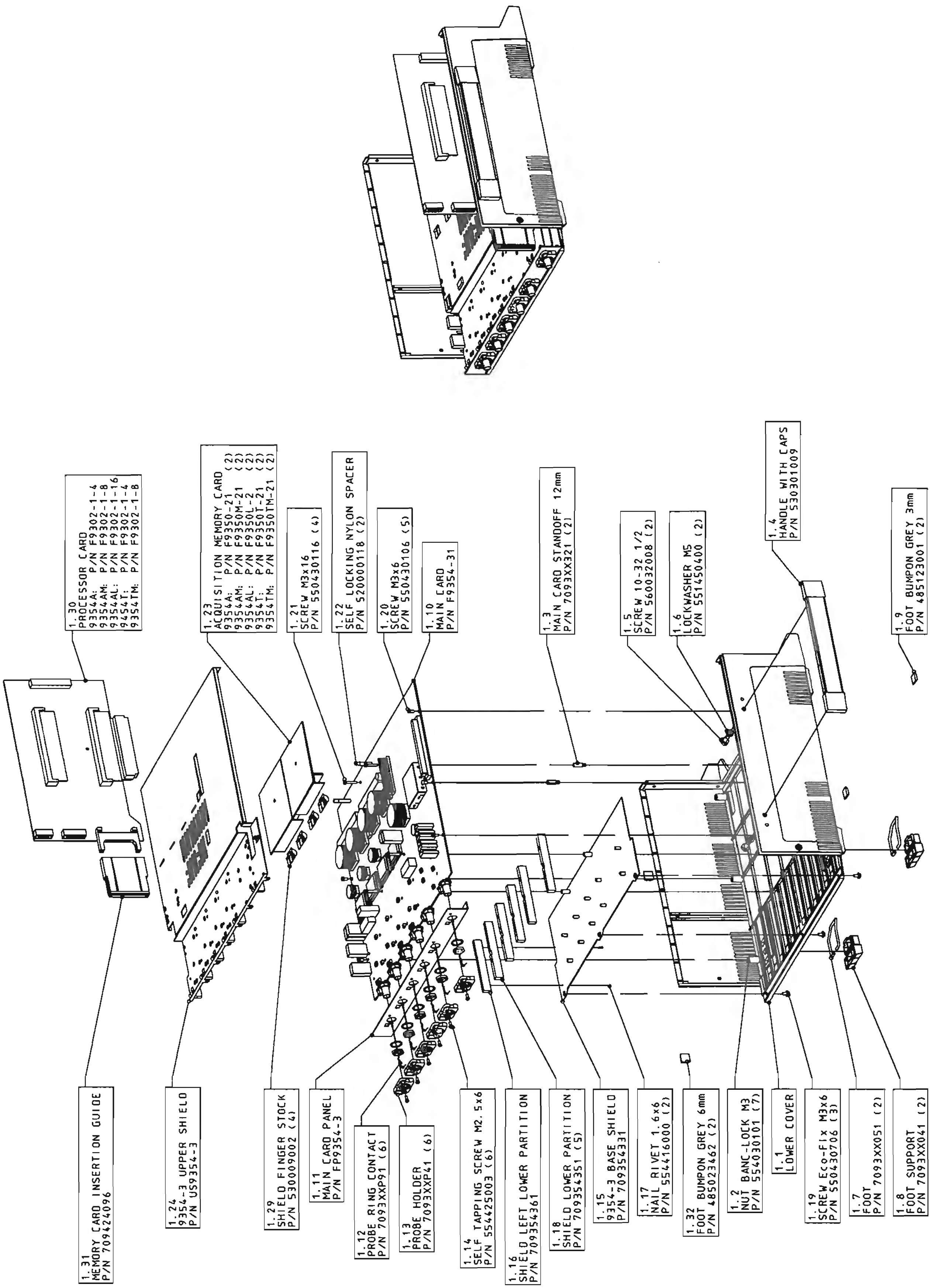


Figure 7.2 : 9354A/T Lower Cover Assembly

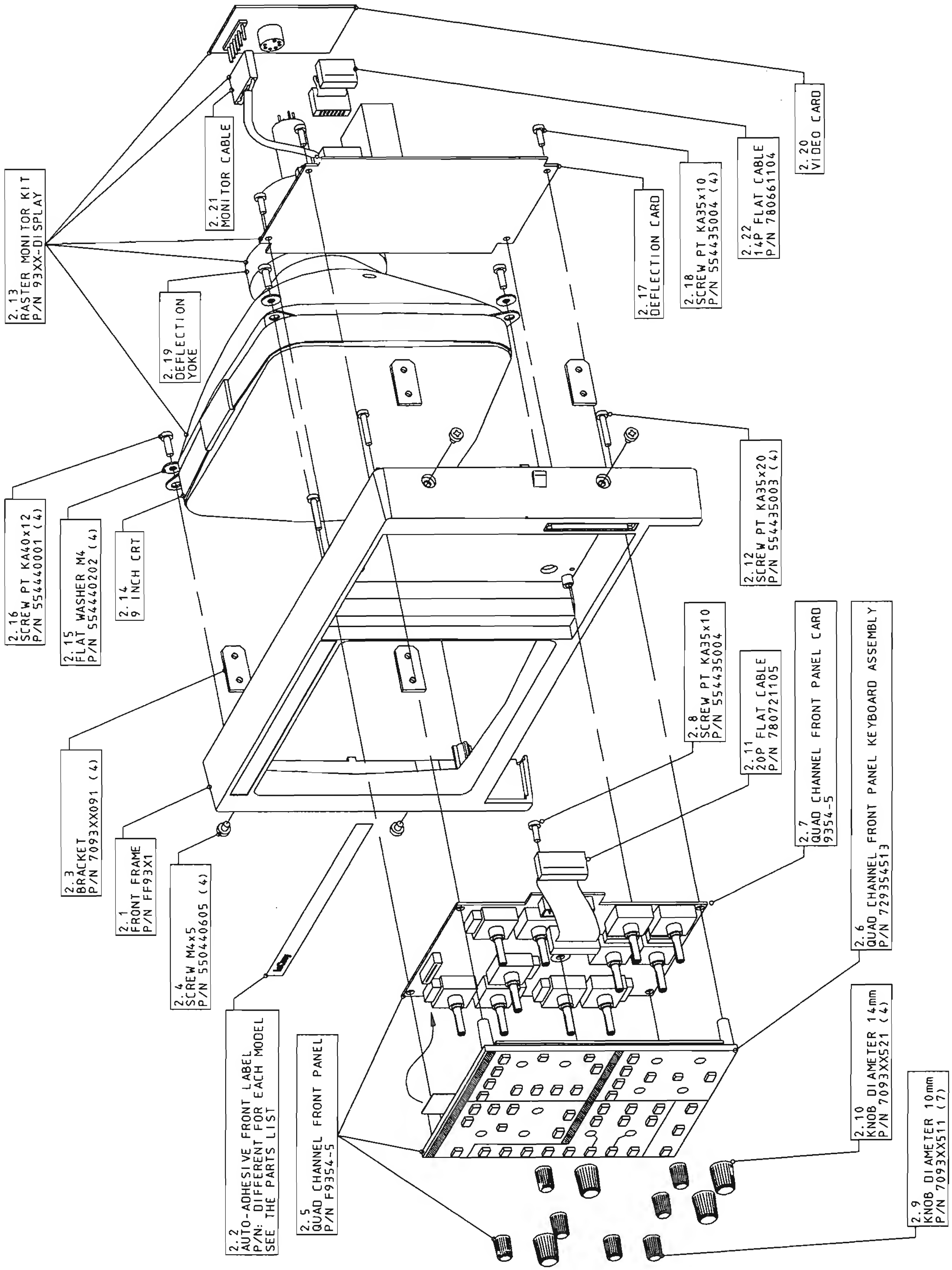


Figure 7.3 : 9354A/T Front Frame Assembly

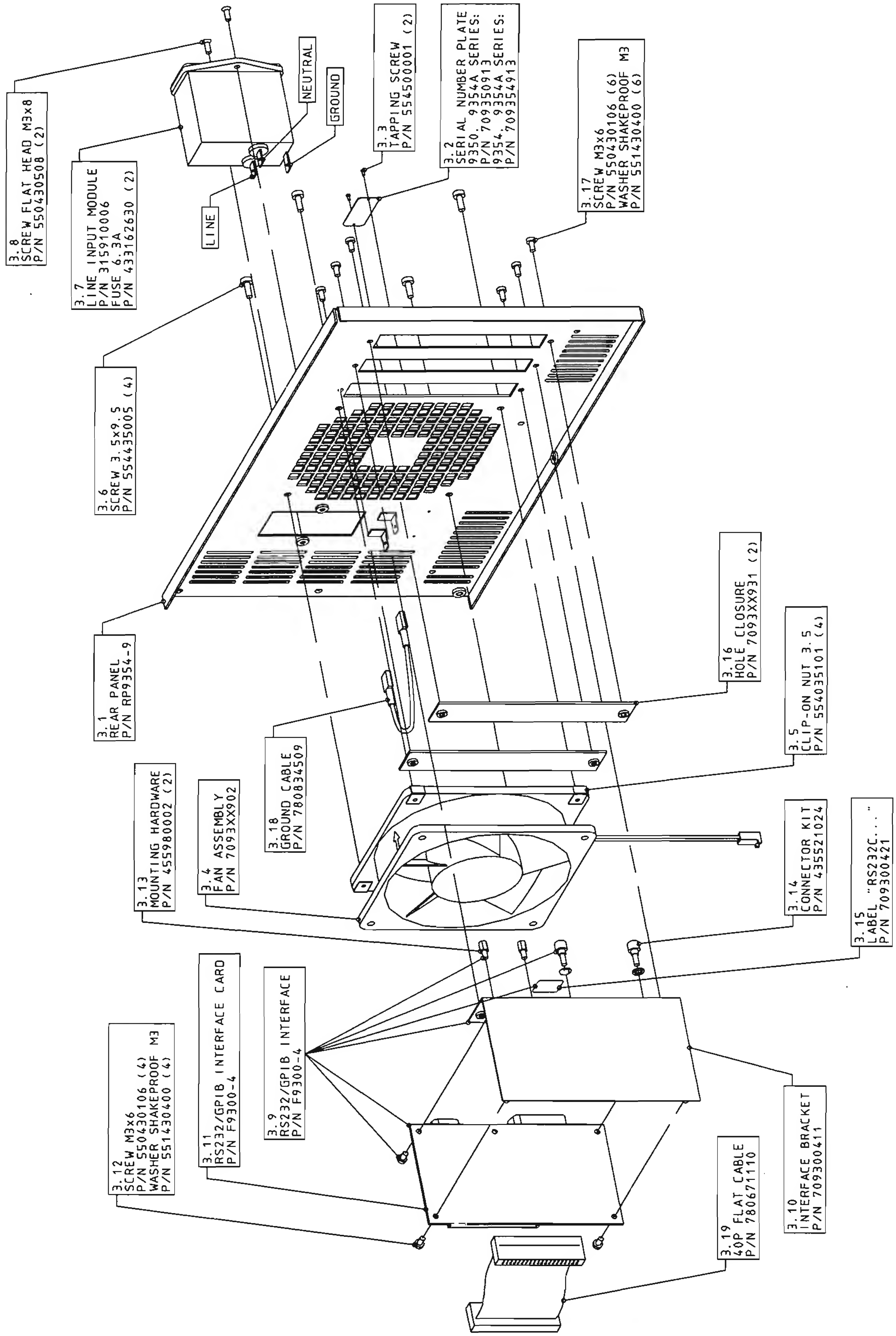


Figure 7.4 : 9354A/T Rear Panel Assembly

7.2.4 Removal of the F9300-4 GPIB/RS232 Interface (3.9)

The GPIB/RS232 interface (3.9) is vertically mounted on the rear panel (3.1).

Remove the following:

- Top cover (7.2.1).
- Two M3x6 screws (3.17) and washers from the rear panel (3.1).
- Disconnect the flat cable (3.19) from the processor board (1.30) connector J5.

The GPIB/RS232 board can be removed forward from the rear panel.

7.2.5 Removal of the Fan (3.4)

Remove the following:
- Top cover (7.2.1)
- Four screws (3.6) and nuts (3.5) from the rear panel (3.1).
- Disconnect the fan power cable from the main card F9354-31 connector J3.

The fan (3.4) part number : 7093XX902 can be removed from the unit.

CAUTION

Note the air flow, the fan extracts air from the unit and expels it.

7.2.6 Removal of the Line Input module (3.7)

WARNING

Disconnect the power cord.
Remove the following:

- Top cover (7.2.1).
- Two screws (3.8) from the rear panel.
- Disconnect the power cable from the power supply connector.
- Disconnect the earth cable (3.18).

The fuse holder assembly (3.7) can be removed from the rear panel (3.1).

7.2.7 Removal of the 93XX-Video (2.20)

- Remove the top cover (7.2.1).
- Disconnect the ground cable from CRT (black wire)
- Disconnect the monitor cable (2.21) from the deflection board, connector W301 & W302

Ease the video board (2.20) carefully toward the back of the DSO, until it is free.

7.2.8 Removal of the 93XX-Yoke (2.19)

- Remove the top cover (7.2.1).
- Remove the 93XX-video board (7.2.7)
- Disconnect the cable from the deflection board connector W201.
- Loose the screw on the yoke ring holder.

The deflection yoke (2.19) can be removed from the cathode ray tube (2.14).

7.2.9 Removal of the front frame Assembly (2)

Remove the following:

- Top cover (7.2.1)
- Two screws (5.8) that secure the front frame assembly (2) to the lower cover (1.1).
- Disconnect the front panel flat cable (2.11) from the processor (1.30) connector J4.
- Disconnect the deflection flat cable (2.22) from the processor board (1.30) connector J6.

The front frame assembly (2) with the CRT (2.14), yoke (2.19), video (2.20), deflection (2.17), front panel (2.7) and keyboard (2.6) can with care be removed forward from the unit.

CAUTION

Hold the CRT very carefully, or place soft padding under it.

7.2.10 Removal of the 93XX-Deflection (2.17)

The deflection board (2.17) is situated to the back of the front panel (2.5).

Remove the following

- Top cover (7.2.1).
- Front frame assembly (7.2.9).
- Disconnect the monitor cable (2.21) which lead to the video board (2.20), connector W301 and W302.
- Disconnect the cable from the deflection yoke, connector W201.
- Disconnect the EHT plug from the receptacle at the right side of the CRT (2.14).

WARNING

Touch the free end of the EHT cable to the ground, this ensures that no significant charge remains. The CRT must be discharged similarly, using a tool or a long screw driver which is first placed to the ground and on the CRT receptacle.

Remove the four M35x10 screws (2.18) that secure the deflection board to the plastic front frame.

The board (2.17) can now be removed from the unit.

7.2.11 Removal of the 93XX-CRT (2.14)

It is necessary to remove the front frame assembly (7.2.9). The CRT is secured to the plastic front frame by four screws (2.16).

- Remove the 93XX-video (7.2.7).
- Remove the 93XX-yoke (7.2.8).
- Disconnect the EHT cable from the deflection board. - Discharge the tube.
- Remove the four screws.

The CRT can now be removed from the front frame.

WARNING

Use care when handling the CRT. Avoid striking it on any object which may cause the tube to implode. Store the cathode ray tube face down on a soft surface.
To avoid electrical shock the CRT should be discharged after the 9354A/T oscilloscope is powered OFF. After disconnecting the EHT plug, ground the CRT anode lead to the metallic display support, repeat the operation to fully dissipate the charge.

7.2.12 Removal of the F9354-5 Front Panel (2.5)

Remove the following:

- Upper cover (7.2.1).
- Front frame assembly (7.2.9).
- 93XX-deflection board (7.2.10).
- Four screws (2.12) that secure the front panel.

The front panel (2.5) with the keyboard (2.6) can be removed forward from the unit.

7.2.13 Removal of the Front Panel Keyboard (2.6)

Remove the following:

- Upper cover (7.2.1).
- Front frame assembly (7.2.9).
- 93XX-deflection board (7.2.10).
- F9354-5 front panel (7.2.12).
- The 11 rotary knobs (2.9 and 2.10).Take great care of the soft plastic
- One screw (2.8) that secures the keyboard to the front panel.
- Disconnect the flat ribbon cable from the front panel connector J2, and remove the keyboard P/N : 729354513.

CAUTION

When removing or installing the keyboard or the front panel, be careful of the fragile flat ribbon cable and connector.

7.2.14 Removal of the Processor (1.30)

The processor F9302-1-4 or F9302-1-8 or F9302-1-16 board is located along the right side of the instrument.

Remove the following:

- Top cover (7.2.1).
- Front frame assembly (7.2.9).
- Disconnect the flat cable (3.19) from the F9300-4 GPIB interface connector J5

The processor can be removed vertically from the main card (1.10) F9354-31 connector J1

CAUTION

Static electricity can damage components (RAM, Eproms, microprocessor...). Antistatic precautions are required.

7.2.15 Removal of the F9354-31 Main Card (1.10)

Remove the following:

- Top cover (7.2.1).
- Front frame assembly (7.2.9).
- Power supply (7.2.2).
- Processor (7.2.14).

The main board with the upper shield (1.2) is horizontally mounted to the lower case cover (1.1).

- Remove the ten M3x20 screws (5.3), two M3x6 (5.4) and six M2.5x6 (5.5) that secure the upper shield (1.2) to the main board and front panel.
- Remove the two M4x8 (5.1) and one M3x6 (5.2) that secure the rear panel assembly (3) to the lower cover (1.1)
- Disconnect the fan cable from connector J3.

The upper shield (1.2) attached to the rear panel (3) can be removed forward from the board.

- Remove the five M3x6 screws (1.20), four M3x16 (1.21) and three M3x6 flat head screws (1.19) that secure the board to the lower cover (1.1).

The main board F9354-31 (1.10) with acquisition memory card F9350/M/T-21 (1.23), base shield (1.15) and card panel (1.11) can be removed from the scope.

CAUTION

Antistatic precautions are required.

7.2.16 Removal of the Handle (1.4)

The handle with two black end caps is secured to the right side of the lower cover (1.1) by two screws (1.5) and washers (1.6).

- Remove the upper cover (7.2.1), and processor board (7.2.14).

The handle can be removed from the lower case.

7.2.17 Removal of the Foot Support (1.8)

The two foot supports are clipped on the lower cover (1.1).

- Remove the foot (1.7) or the support (1.8) by inserting a small flat screwdriver under the support

7.2.18 Removal of the 93XX-FD01 Floppy Disk Drive Option

- Remove the upper cover (7.2.1).
- Disconnect the flat ribbon cable from the F9300-6 interface (see figure 7.6).
- Remove the two M3x6 screws that secure the floppy drive support to the upper cover.
- Remove the support 70FD01021 and frame 70FD01031 from the cover.
- Remove the four M2.5x4 screws that secure the floppy to the support

The floppy disk (6.3) drive can be removed from the frame

7.2.19 Removal of the 93XX-GP01 Graphic Printer and F9300-7 Controller Option

- Remove the upper cover (7.2.1).
- Disconnect the power cable (780210030) from the PS9351 power supply (see figure 7.7).
- Disconnect the flat ribbon cable (780791604) from the F9300-7 controller (see figure 7.7).
- Disconnect the flat ribbon cable (780721022) between the F9300-6 interface and F9300-7 controller.
- Remove the four M3x6 screws that secure the F9300-7 controller to frame (70GP01031).
- Remove the F9300-7 controller
- Remove the two M3x6 screws that secure the printer to the frame

The graphic printer (7.3) can now be removed from the upper cover.

7.2.20 Removal of the F9300-6 Centronics Interface Option

- Remove the upper cover (7.2.1).
- Remove the two M3x6 screws from the rear panel
- Disconnect the flat cable from the F9300-4 GPIB/RS232 board (see figure 7.6 or 7.7).

The Centronics interface board can be removed forward from the rear panel.

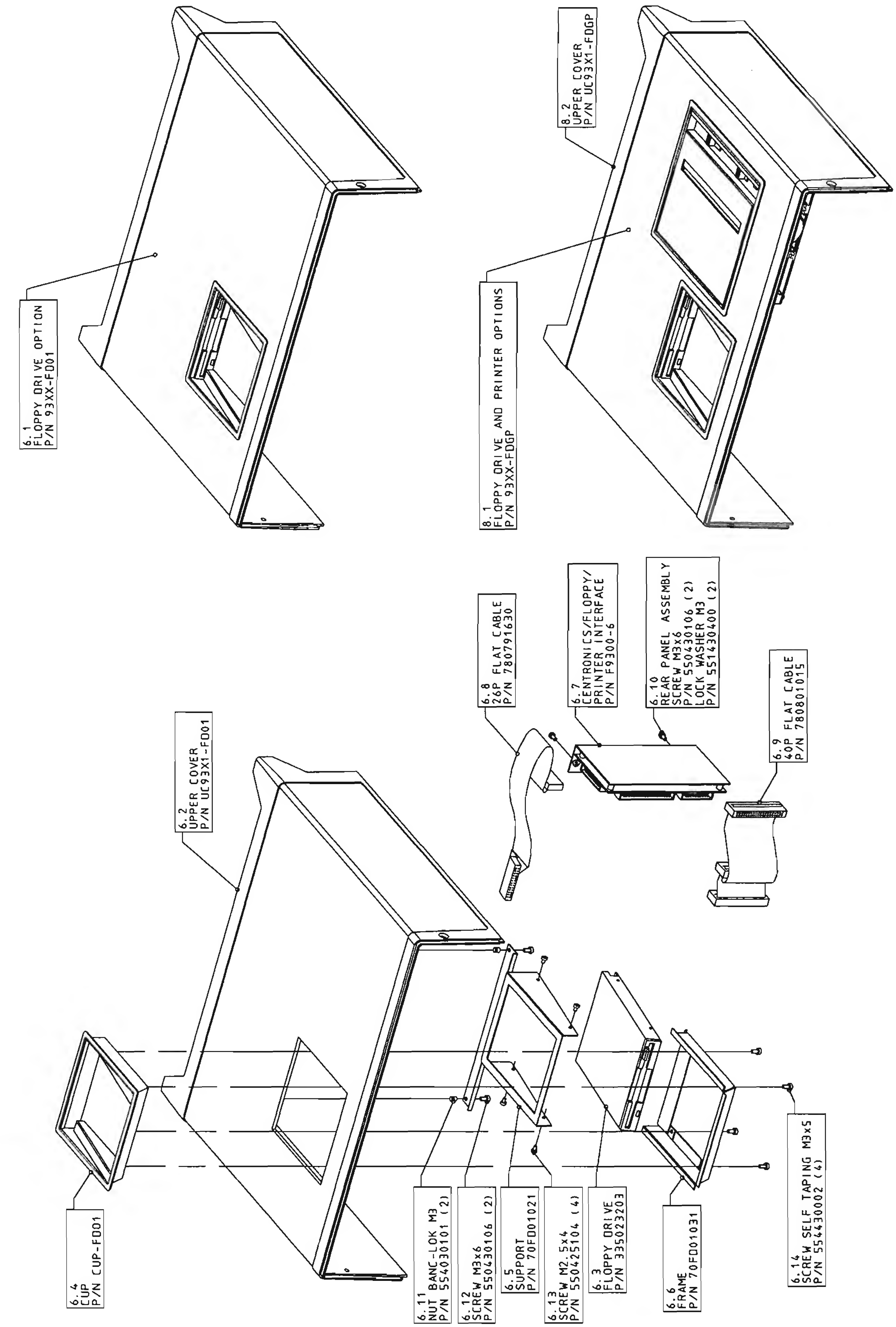


Figure 7.5 : 9354A/T Floppy Assembly

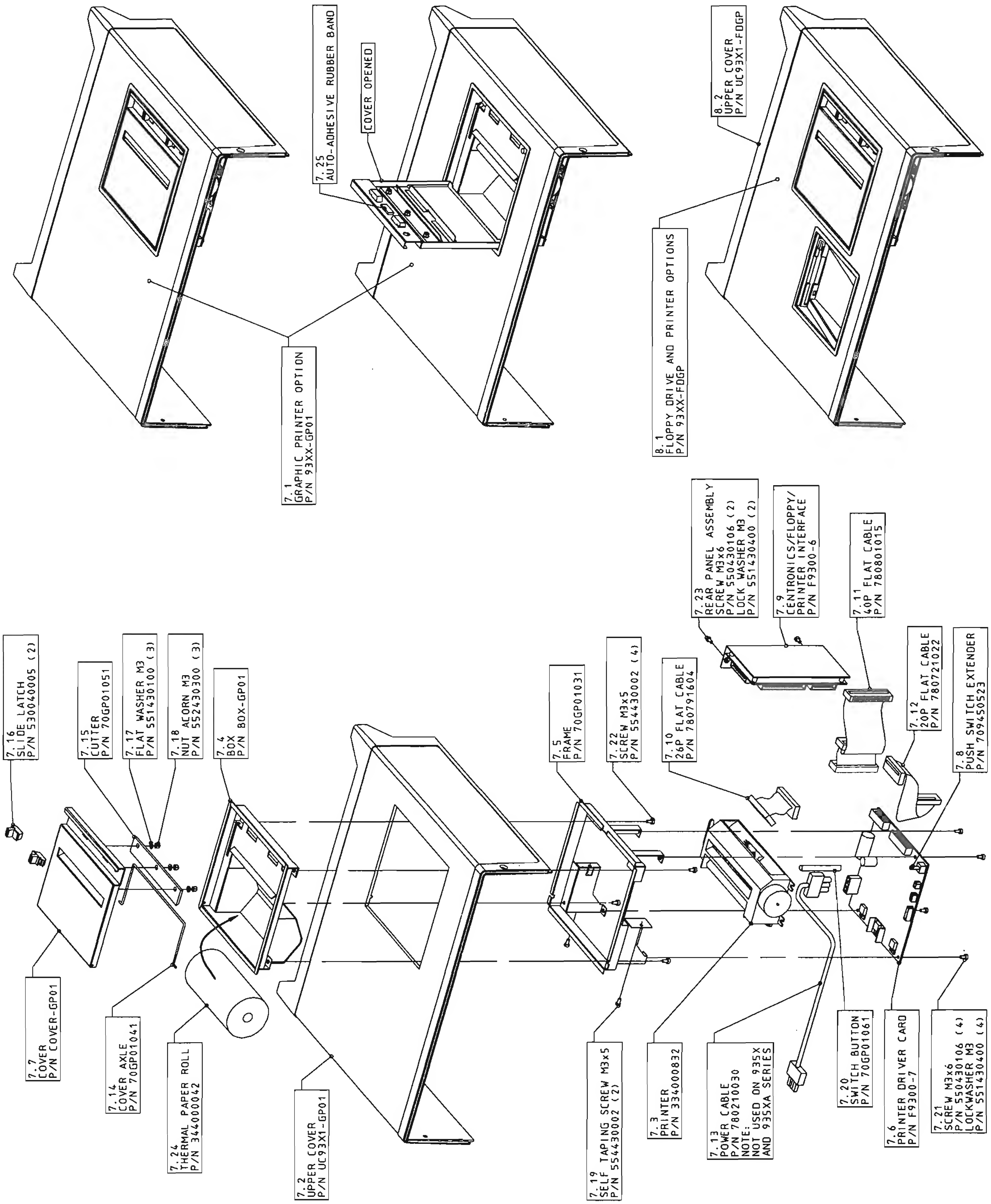


Figure 7.6 : 9354A/T Graphic Printer Assembly

7.3 Software Upgrade Procedure

F9302-1-X processor board has one 8MB Flash Prom which contains the program memory and the character font used by the graphic processor of the raster scan display.

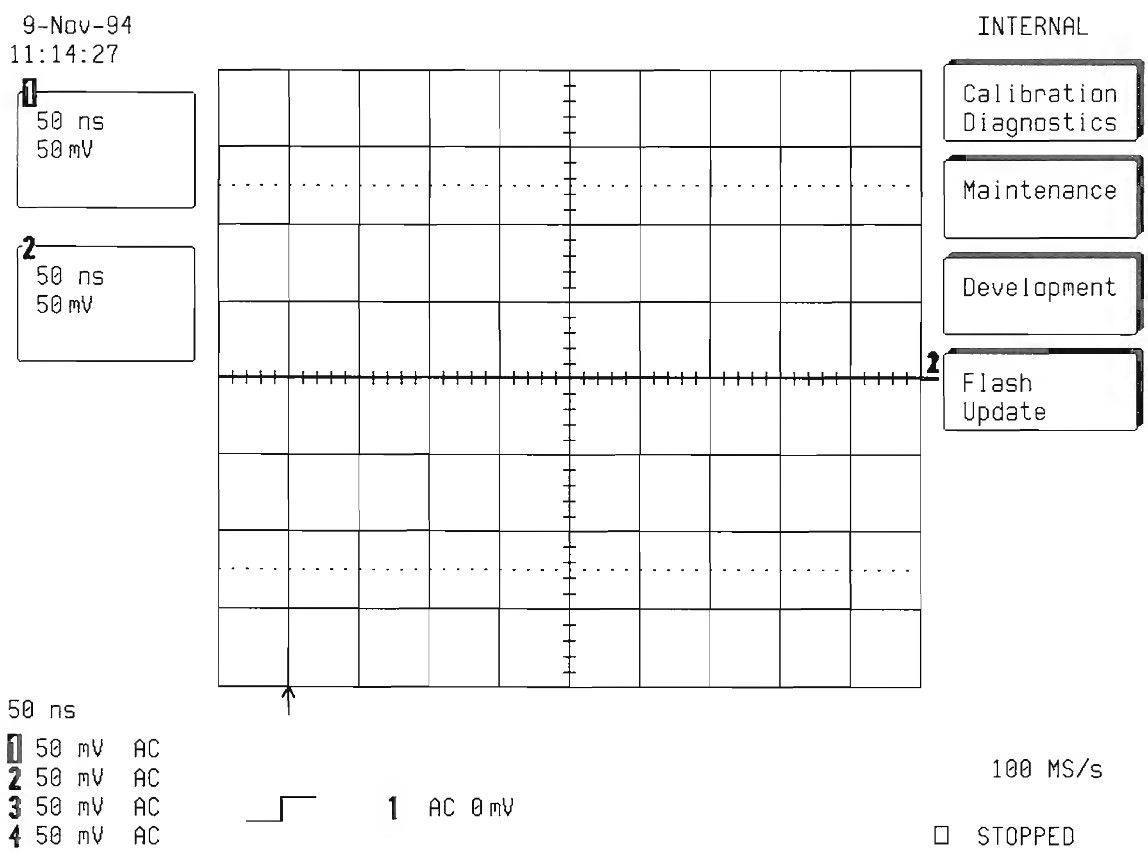
After any software change, a general instrument reset is mandatory. Simultaneously press the autosetup button, the top menu button and the return button.

7.3.1 Upgrading Firmware

LeCroy Corporation has a policy of continually improving and upgrading its products.

The instrument is equipped with Flash Prom on processor board, the Software is upgraded to the latest version using the Memory Card interface.

- Insert one Memory card with latest firmware revision, and power on the scope.
- The internal menu is entered by simultaneously depressing the third and fourth menu push buttons on the right hand side of the CRT and then by depressing the fifth.



- Select " **Flash Update** " and push twice " **Update Program** ".

The Software is then downloaded to the Flash Prom on the processor board.

```
30-Nov-94                                                   FLASH UPDATE
 9:51:00

                                                            Update
                                                            Program


        Warning:                                            Update
          Reprogramming the flash memory is a procedure to be   Loader
          performed by qualified service personnel.

          Any loss of power during the update process could Update
          cause the scope to require factory service.       Both

          The update process requires a LeCroy supplied
          memory card which contains the necessary information
          to update your scope software.
```

```
30-Nov-94    Program transferred to Flash memory without error   FLASH UPDATE
 9:51:52

                                                            Update
                                                            Program


        FLASH UPDATE SUCCESSFUL:                            Update
          The flash memory reprogramming process is         Loader
          complete and was successful.

          Please cycle the power to the scope to            Update
          start the updated code.                           Both
```

7.3.2 Changing Software Options

The software option selection GAL is located on the processor board at location A49.
Insert or replace the GAL to select new options.
Make sure that the orientation notch is correctly aligned with the PCB.

7.3.3 Software Option Selection GAL

The following software options are available : (see section 2)

WP01	Advanced Math package
WP02	Basic FFT package
CARD	Memory card

OPTIONS			GAL Description
Memory Card	WP02	WP01	CLE XXX-R XXX = Software option, R = Release
no	no	no	GAL Not Necessary
no	no	yes	CLE 001-A
no	yes	no	CLE 002-A
no	yes	yes	CLE 003-A
yes	no	no	CLE 200-A
yes	no	yes	CLE 201-A
yes	yes	no	CLE 202-A
yes	yes	yes	CLE 203-A

7.3.4 Processor Board Exchange Procedure

The replacement board is supplied without any options. Therefore the existing GAL (Loc A49) must be transferred from the faulty board to the new board. After upgrading firmware or changing the software option, check that the scope boots correctly. Then check in the system summary, by using the show status button on the front panel, the software version, software options and serial number.
The serial number of the 9354A/T oscilloscope is loaded in the real time clock memory which is battery backed up. If it becomes necessary to replace the processor board, the serial number must be loaded in the memory of the new board by using LeCroy program " LeCalsoft " under GPIB remote control.
To run " LeCalsoft " type SKP.exe, in the main menu type S, and follow the instructions, use five digits to enter the serial number (i.e. 02175).

```
16-Jan-95                                              STATUS
16:24:16
                                                       Acquisition
Serial Number  935402175                               System
                                                       Text & Times
Soft Version   9354A_  06.0.0                          Waveform
    Wednesday, November 23, 1994 5:14 PM               Memory Used
    (build 43)

Soft Options
    WP01   WP02   CKIO   MC01


Hard Options                                           MORE VERSION
    GPIB   R232   CLBZ   CPU3   I2C                    INFORMATION


Main RAM size   4 Mbytes
```

7.4 Equipment and Spare Parts Recommended for Service

7.4.1 Equipment

The following equipment is needed to provide the technician access to the 9354A/T subassemblies during repair and calibration (see also Performance Verification section 5).

Instrument	Qty	Specifications	Recommended
Signal Generator (sine wave)	1	Frequency : 500 KHz to 1 GHz Accuracy : 0.001 % Amplitude : 1 V peak to peak	Marconi 2030
Signal Generator (sine wave)	1	Frequency : 5 KHz Amplitude : 6 V peak to peak	LeCroy LW420
DC precision Power Supply	1	Amplitude : 10 V, DC Accuracy : < 0.1 %	Tektronix PS5004
Digital Multimeter	1	5 digits	Keithley 199
Fast pulser	1	Rise time < 500 psec	LeCroy 4969
Digital scope	1	Bandwidth 350 MHz	LeCroy 9310A
Cable	1	BNC, 50 Ω, length 20 cm (7.87 inches)	Suhner
Cable	1	BNC, 50 Ω, length 100 cm (39.37 inches)	Suhner
BNC T adapter	1	BNC, 50 Ω, T adapter	Suhner

7.4.2 Spare Parts

In order to make the repair of 9354A/T DSO's series at board level, a minimum stock of boards is at least one each:

- F9302-1-4 : Processor board for 9354A and 9354T
- F9302-1-8 : Processor board for 9354AM and 9354TM
- F9302-1-16 : Processor board for 9354AL

- F9350-21 : Acquisition memory for 9354A
- F9350M-21 : Acquisition memory for 9354AM
- F9350T-21 : Acquisition memory for 9354T
- F9350TM-21 : Acquisition memory for 9354TM
- F9350L-2 : Acquisition memory for 9354AL

- F9354-31 : Main board for 9354A, 9354AM, 9354AL, 9354T & 9454TM

- F9300-4 : GPIB/RS232 interface

- F9354-5 : Front panel with keyboard

- 93XX-Display : Raster monitor kit

- PS9351 : Power supply

If the unit is equipped with the 93XX-FD01 option :
- F9300-6 : Floppy, Graphic printer, Centronics Interface
- 335023203 : Floppy disk drive

If the unit is equipped with the 93XX-GP01 option :
- F9300-6 : Graphic printer, Floppy, Centronics Interface
- F9300-7 : Graphic printer controller
- 334000832 : LPT5446 Seiko Graphic printer

If the unit is equipped with the 93XX-HD01 option :
- F9300-8 : Hard disk Interface
- HDD02 : Hard disk drive

The other parts (fan, fuse holder, scope handle, covers, rear panel...) are not on the above list because they are reliable parts and the probability of failure is very low.

7.5 Troubleshooting and Flow Charts

7.5.1 Introduction

The troubleshooting information contained in this section is intended for use by qualified personnel having a basic understanding of electronics (analog and digital). In order to simplify servicing and minimize downtime, the following list of possible symptoms, likely causes, and troubleshooting steps have been prepared.
The first step in troubleshooting is to check for obvious items like blown fuses.
The power supply is the next item to check before proceeding to more detailed troubleshooting, since noise or low power supply voltages can cause a variety of digital and analog problems.

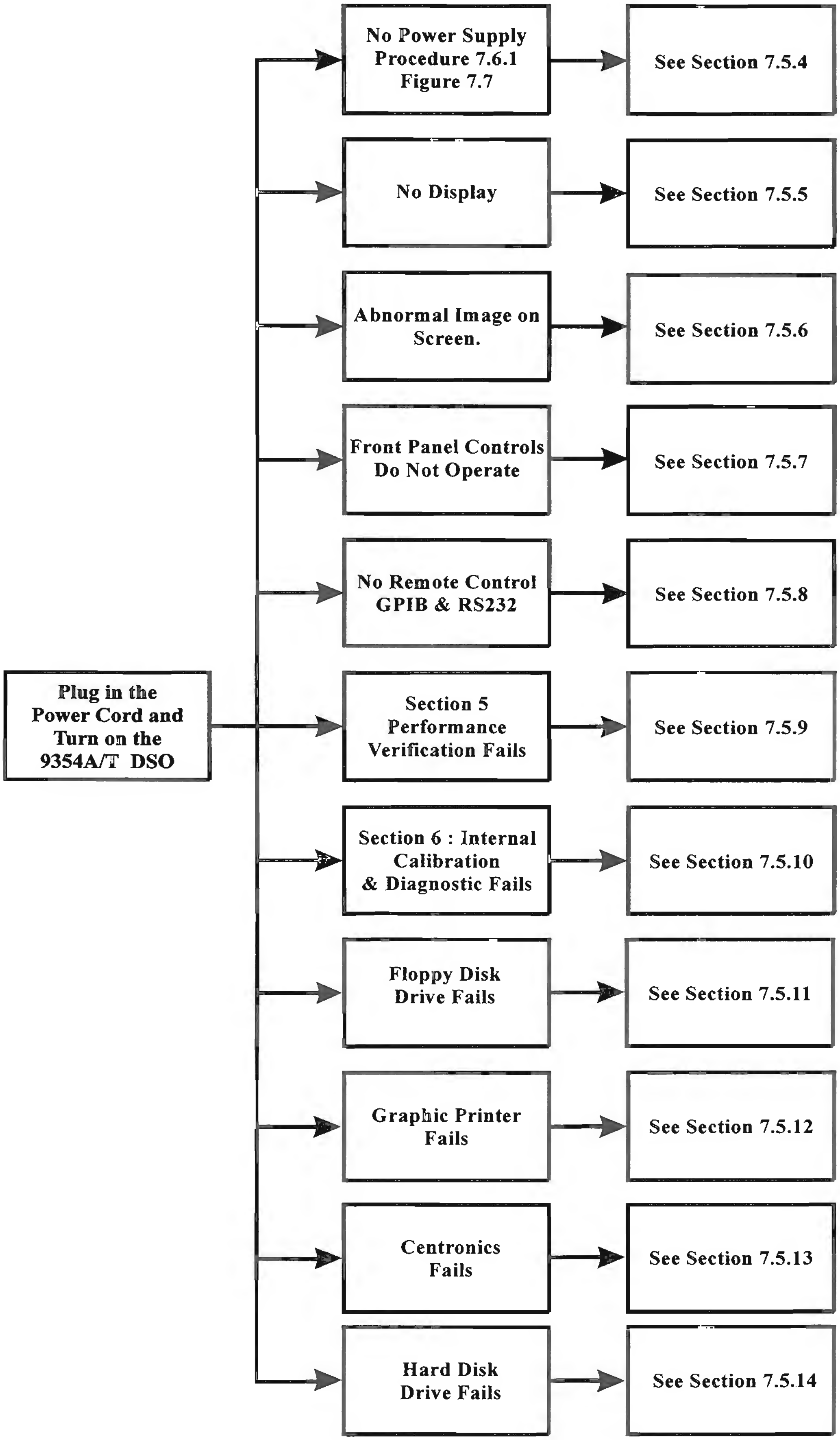
7.5.2 Line Voltage Autoranging

The 9354A/T oscilloscope operates from a 115 V (90 to 130 V) or 220 V (180 to 260 V) normal power source at 47 Hz to 63Hz.
No voltage selection is required since the instrument automatically adapts to the line voltage which is present. The instrument operates at line frequencies up to 440 Hz.

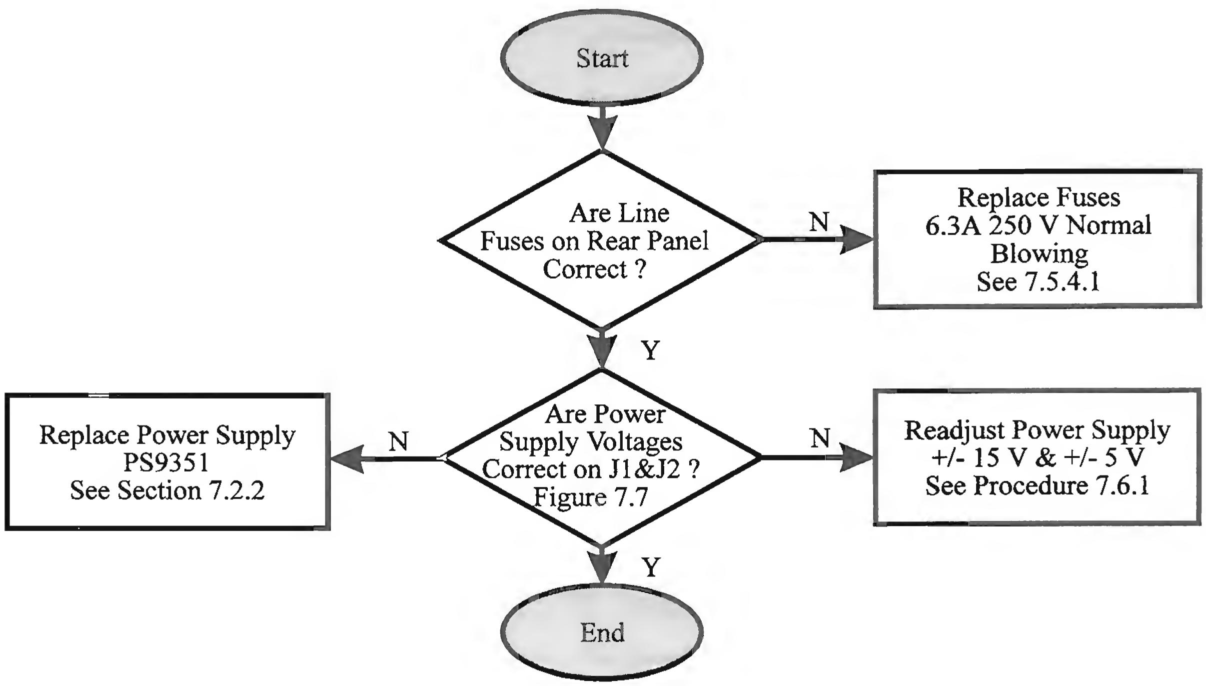
7.5.3 Initial Troubleshooting Chart

Most procedures in this section will allow troubleshooting down to the **BOARD LEVEL.**

Defective circuit boards will be repaired or exchanged by the regional LeCroy service office or the local representative (see section 1.4).


Plug in the Power Cord and Turn on the 9354A/T DSO
No Power Supply Procedure 7.6.1 Figure 7.7
See Section 7.5.4
No Display
See Section 7.5.5
Abnormal Image on Screen.
See Section 7.5.6
Front Panel Controls Do Not Operate
See Section 7.5.7
No Remote Control GPIB & RS232
See Section 7.5.8
Section 5 Performance Verification Fails
See Section 7.5.9
Section 6 : Internal Calibration & Diagnostic Fails
See Section 7.5.10
Floppy Disk Drive Fails
See Section 7.5.11
Graphic Printer Fails
See Section 7.5.12
Centronics Fails
See Section 7.5.13
Hard Disk Drive Fails
See Section 7.5.14

7.5.4 No Power Supply



7.5.4.1 Line Fuses Replacement

The power supply of the oscilloscope is protected against short circuits and overload by means of two 6.3A / 250 V fuses located above the main plugs.

WARNING

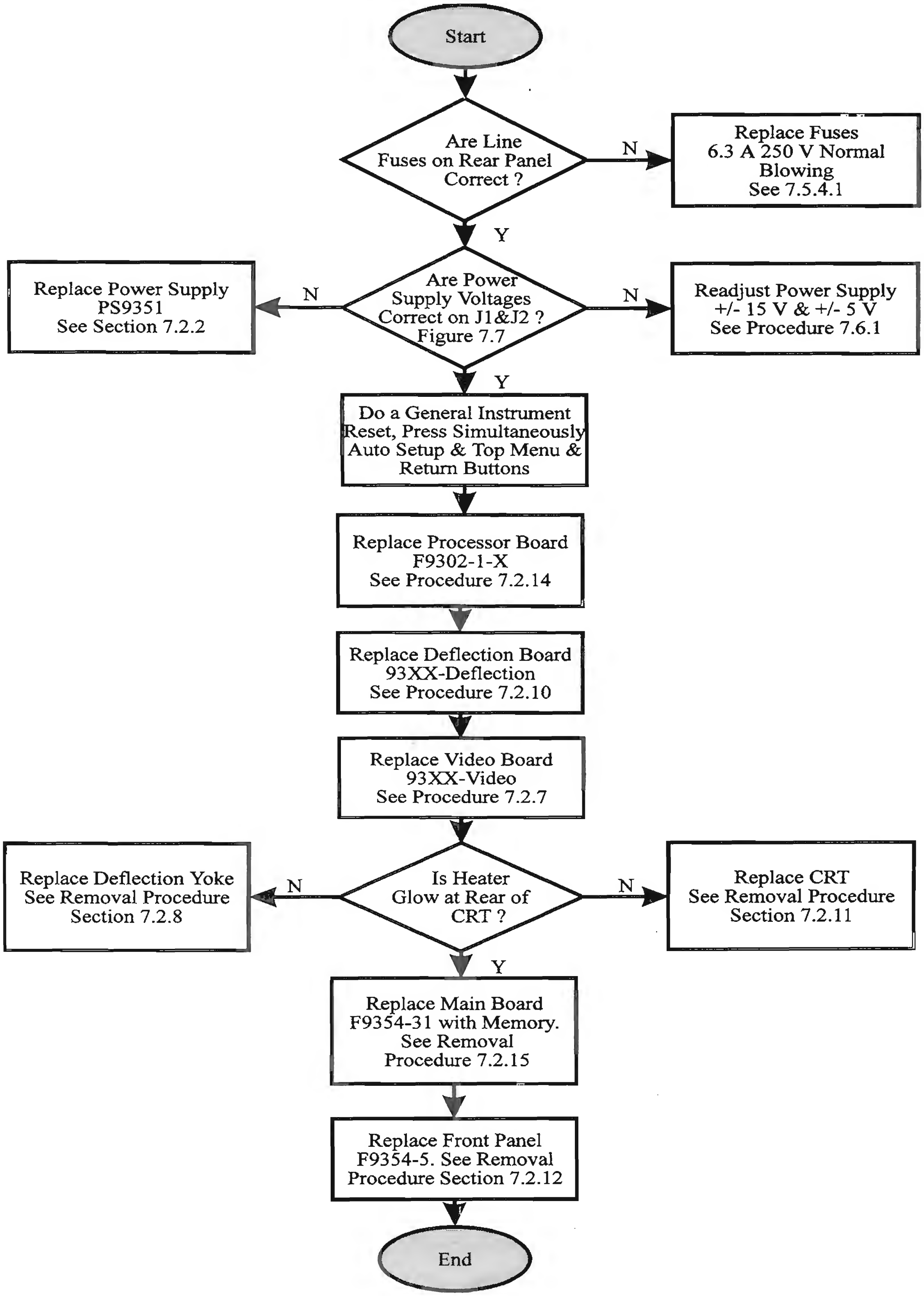
Disconnect the instrument from the power line and from other equipment before replacing fuses.

To replace line fuses, proceed as follow :

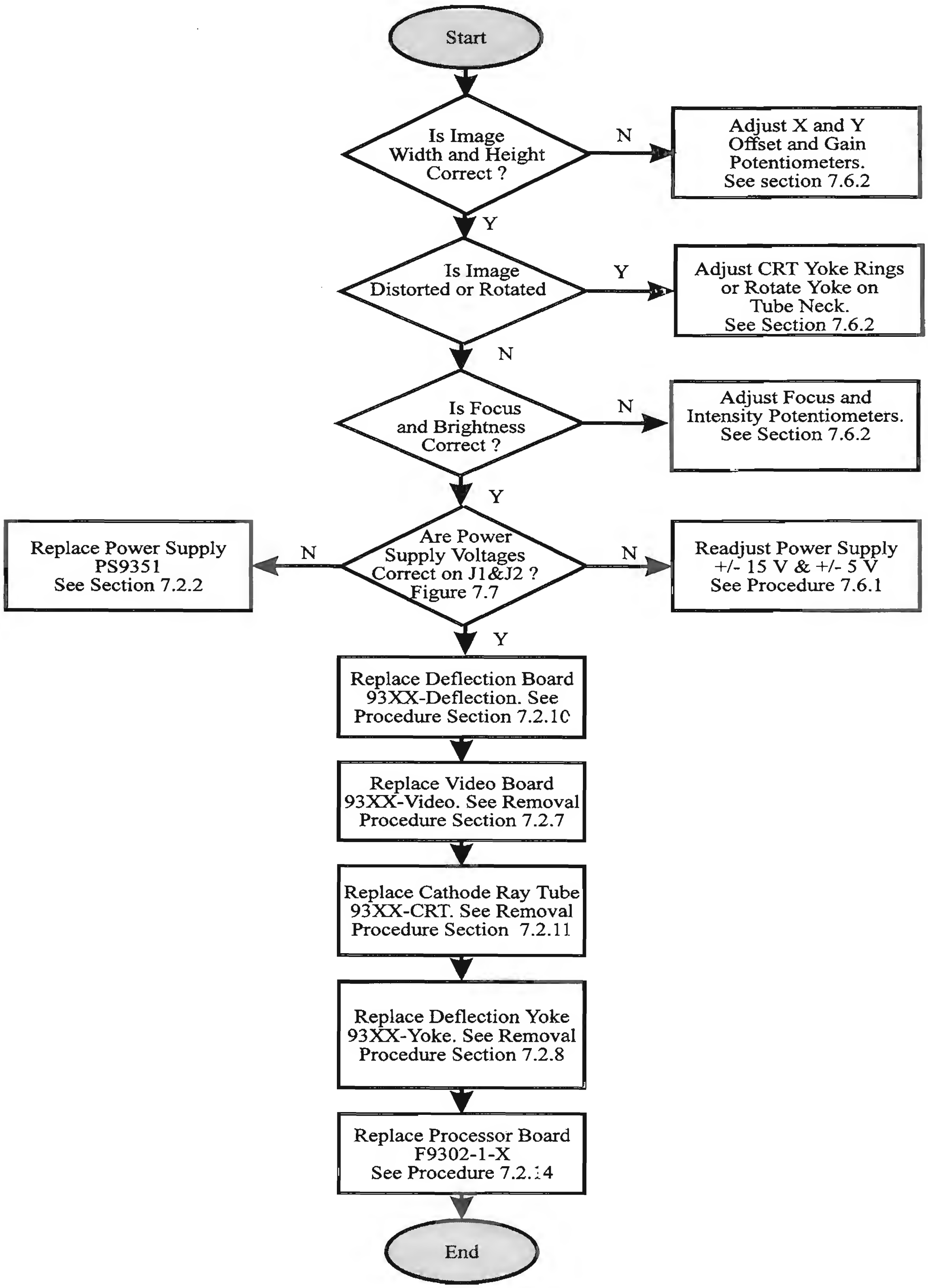
- Turn off the power and disconnect the line cord from the instrument
- Open the fuse box by inserting a small flat screwdriver under the plastic cover and remove the fuse carrier from the holder
- Remove the 6.3 amp fuse and replace it with the proper type:

6.3 amp/250 V, normal blowing.
LeCroy part number: 433 162 630

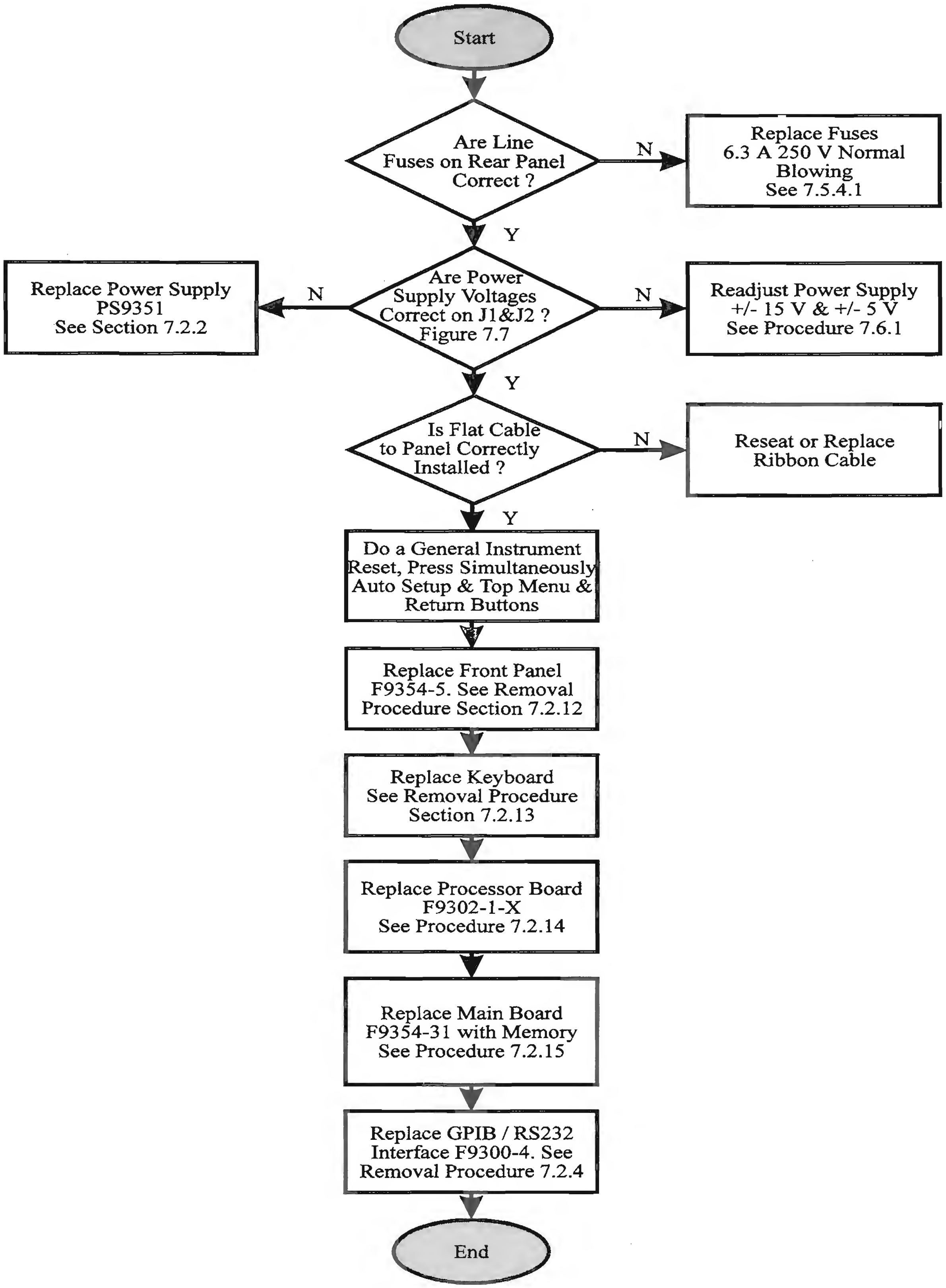
7.5.5 No Display



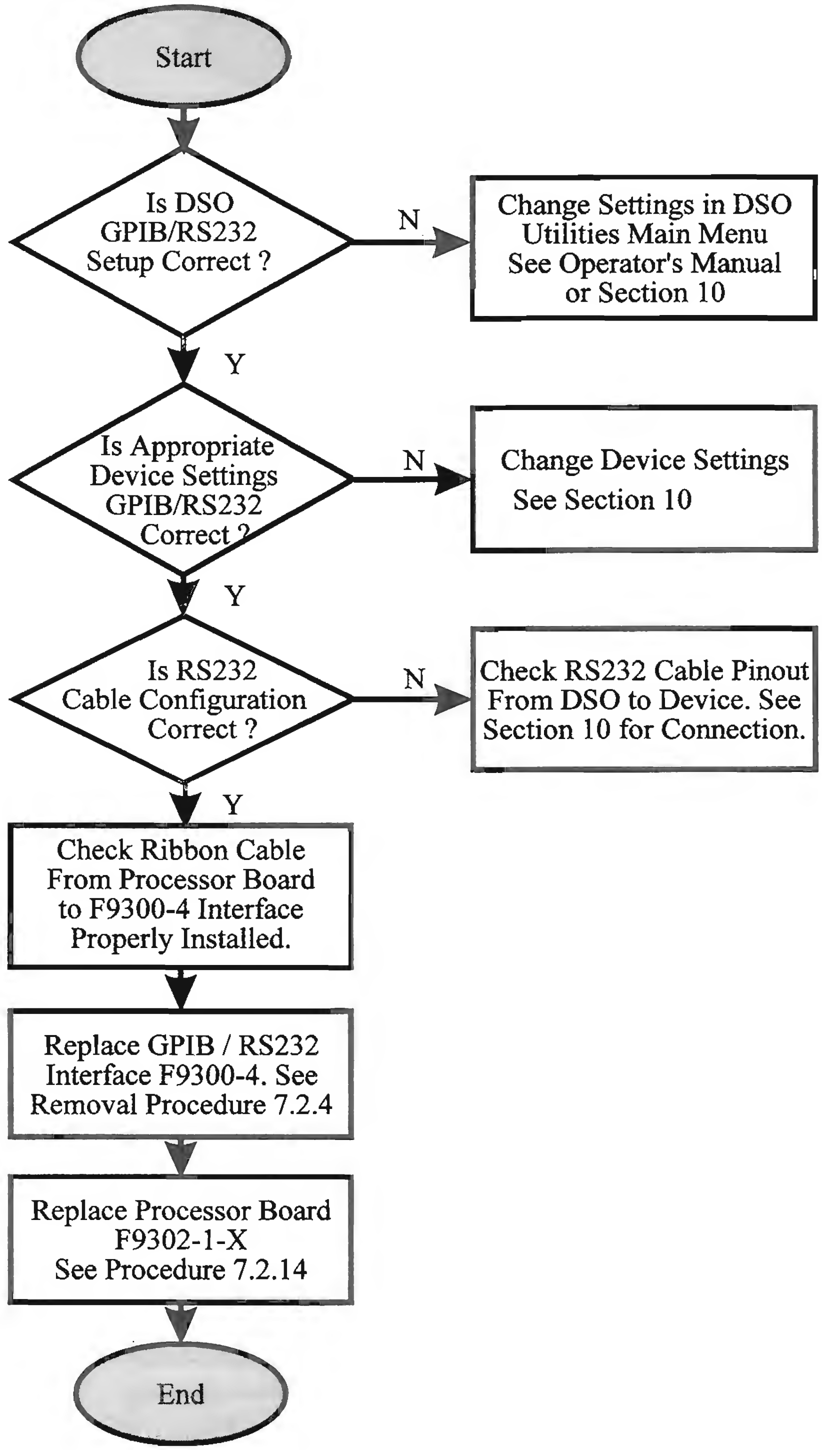
7.5.6 Abnormal Image On Screen



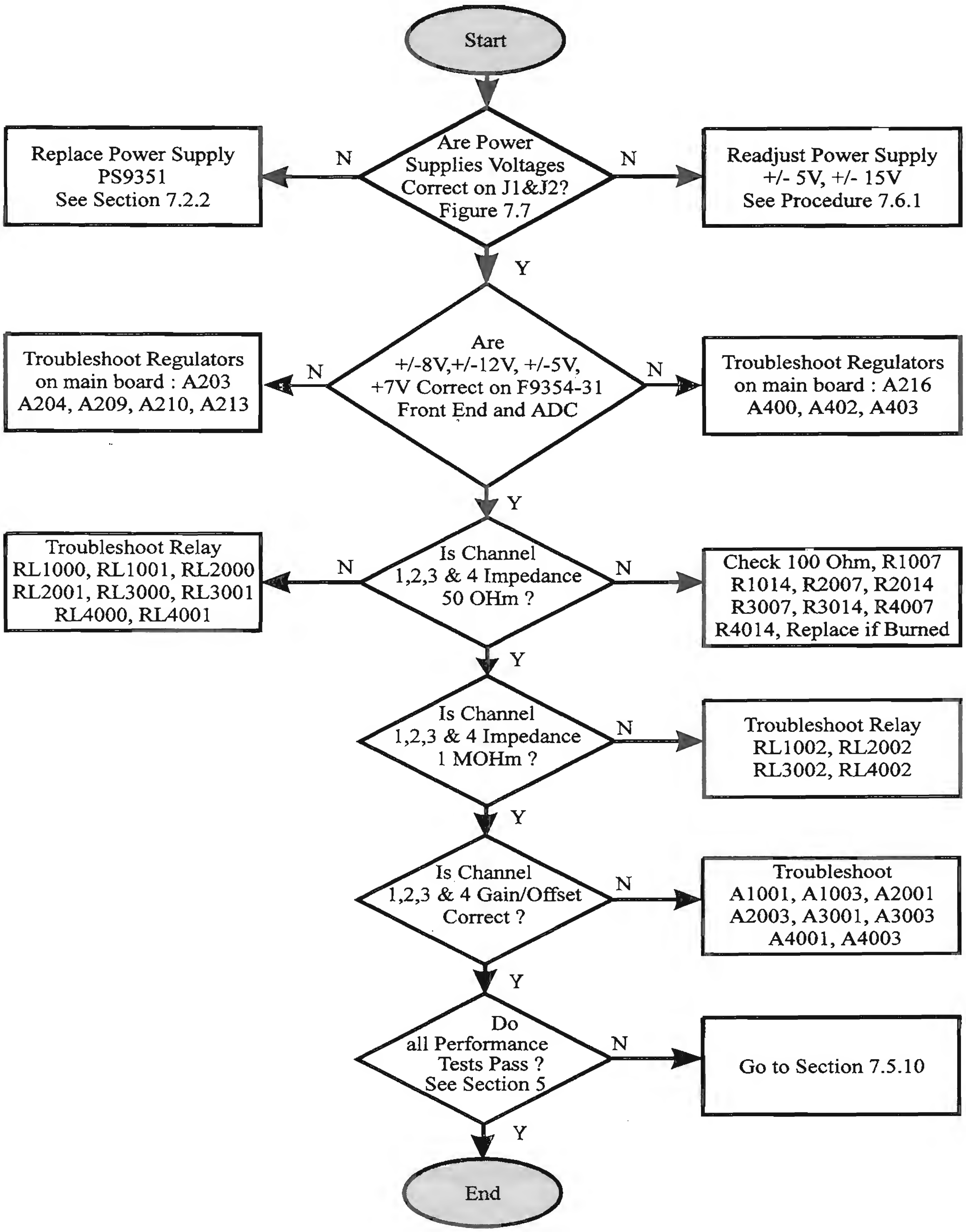
7.5.7 Front Panel Controls Do Not Operate



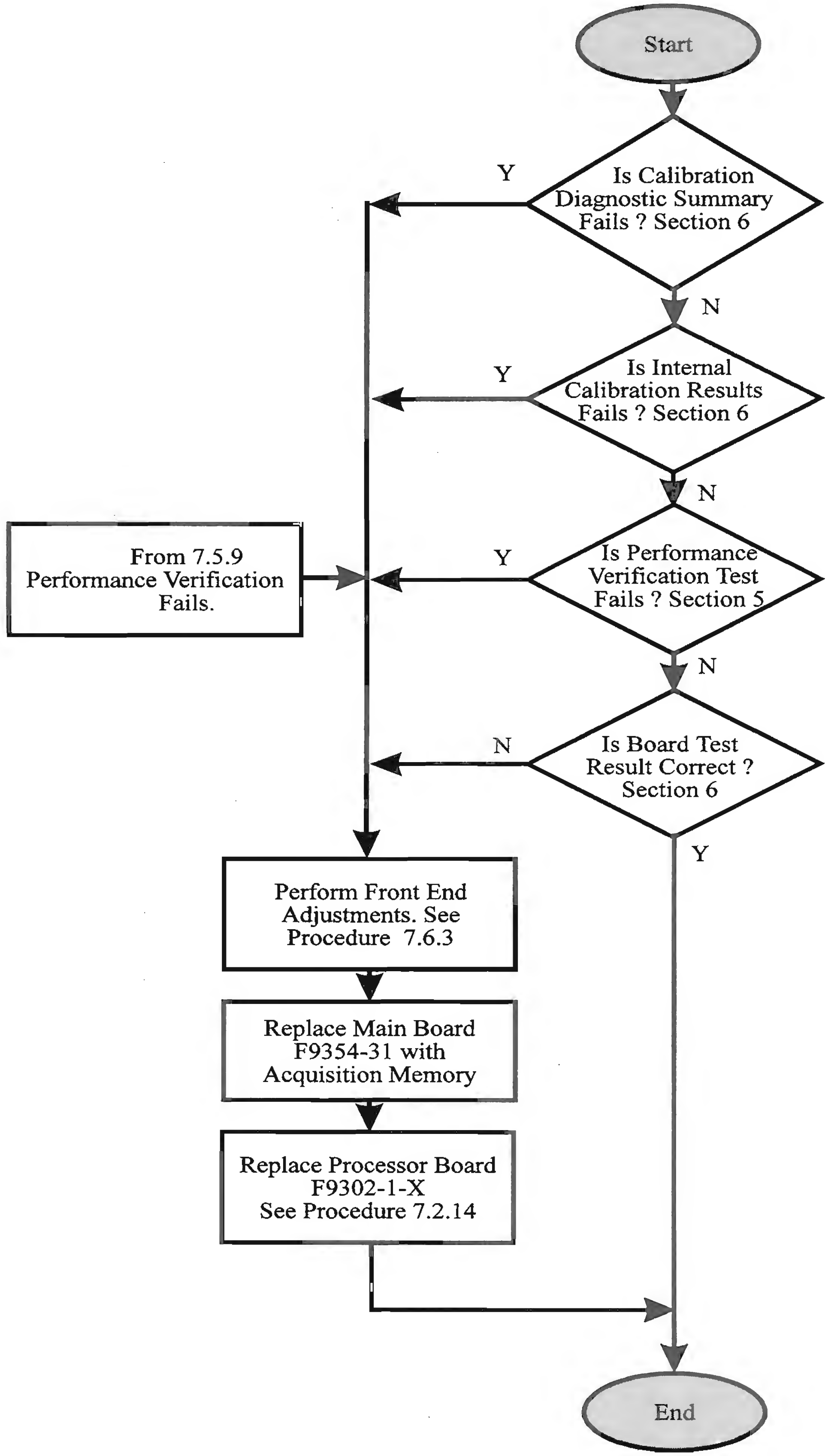
7.5.8 No Remote Control GPIB and RS232



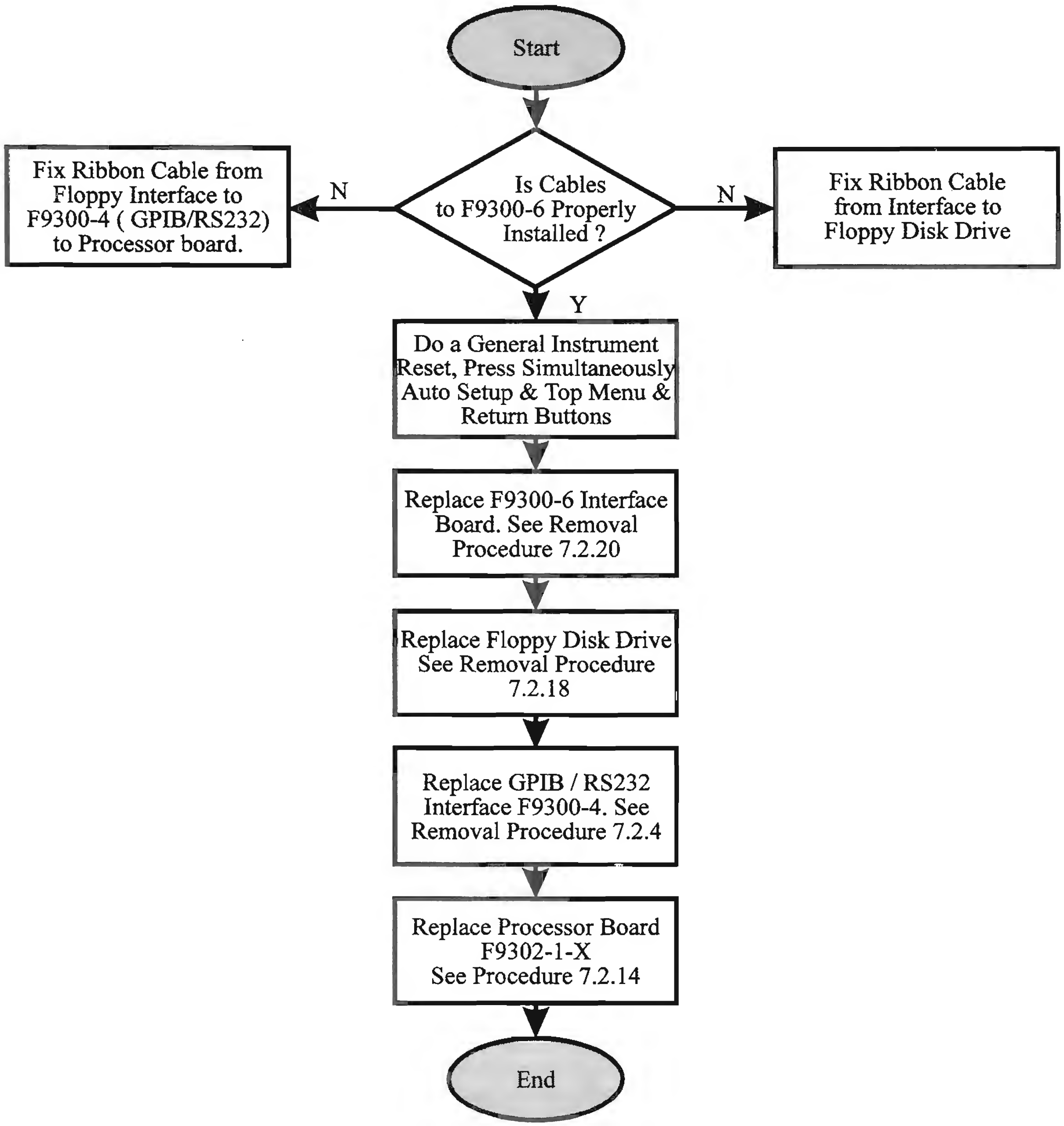
7.5.9 Performance Verification Fails



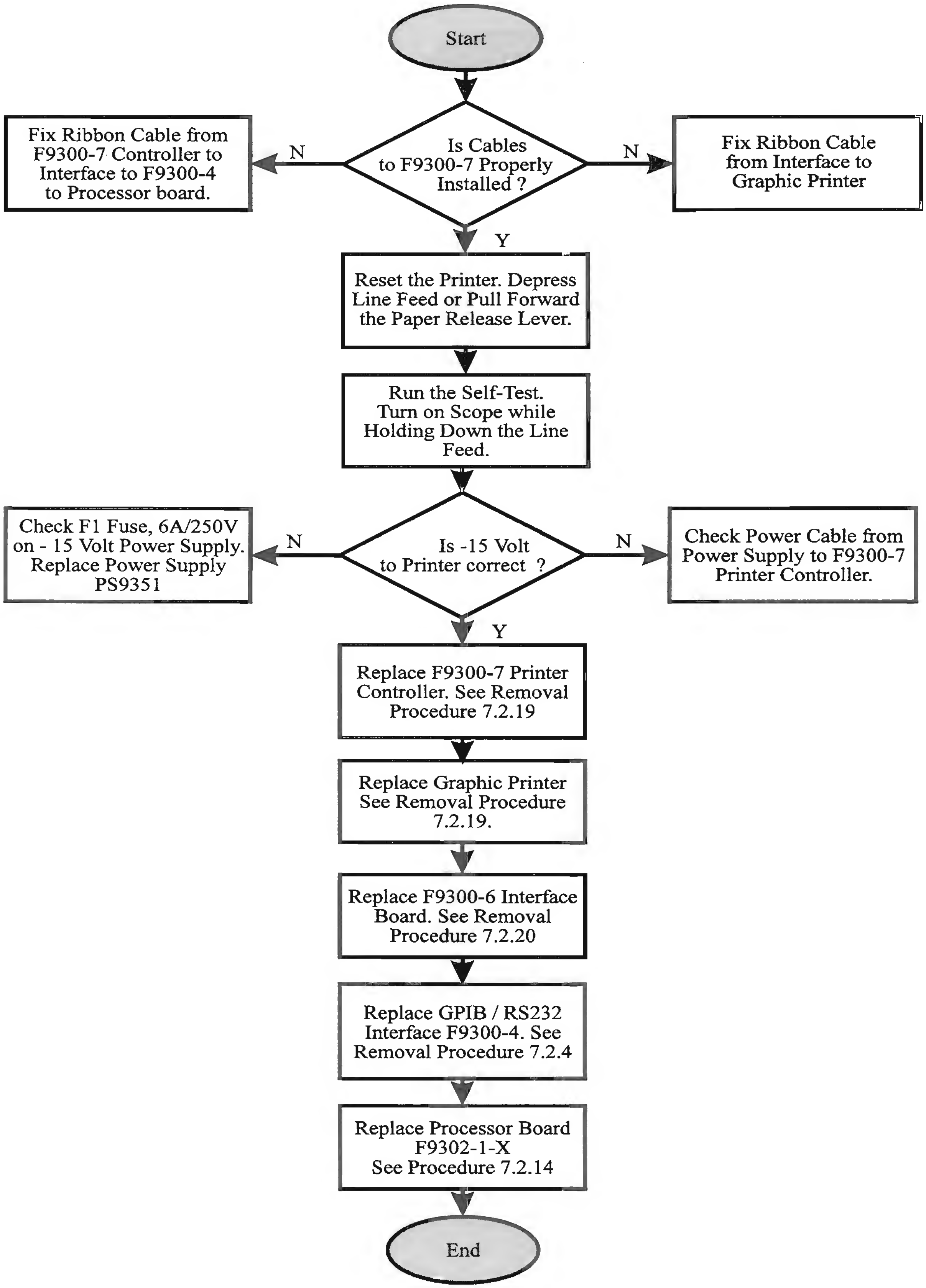
7.5.10 Internal Calibration Fails



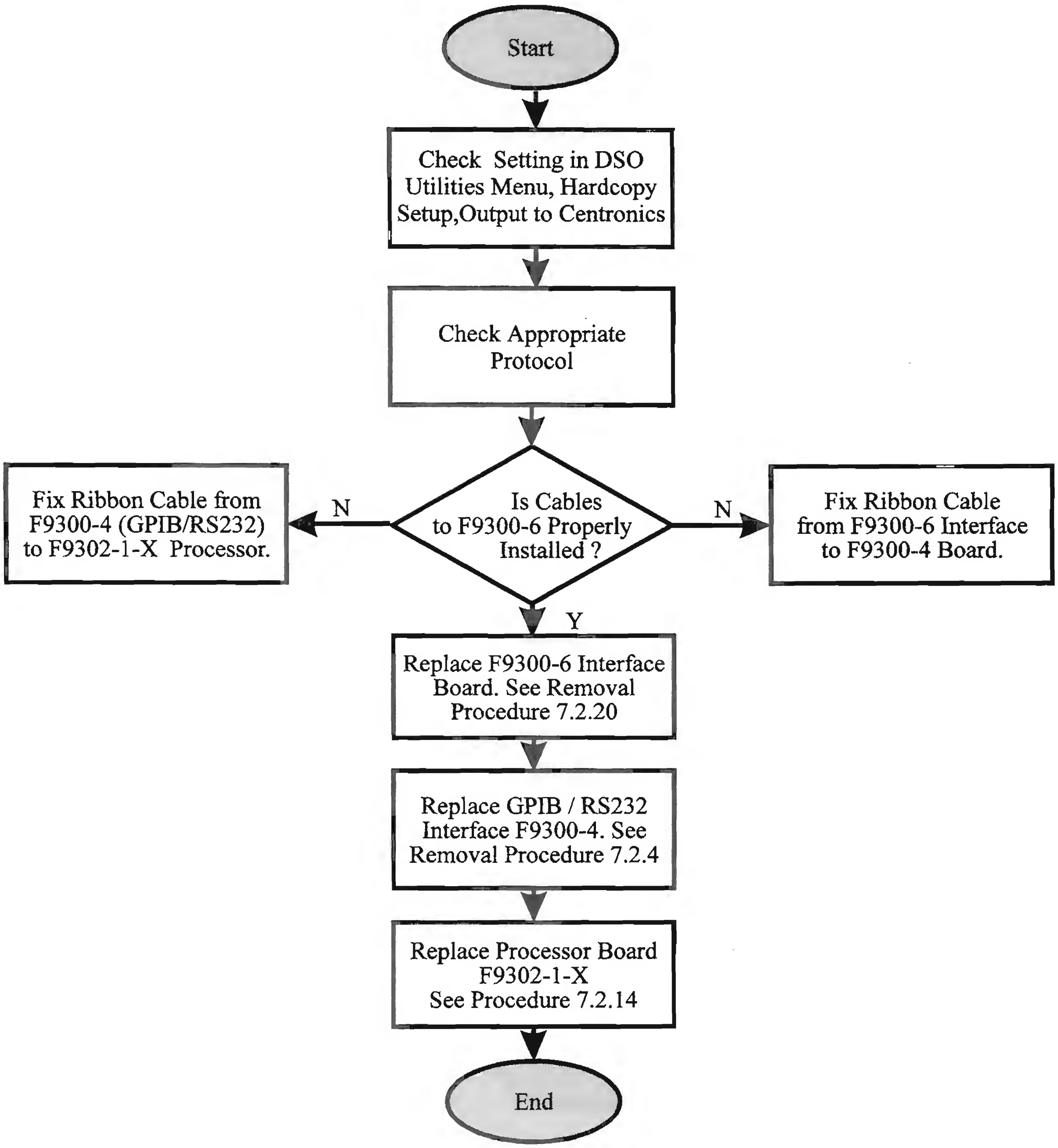
7.5.11 Floppy Disk Drive Fails



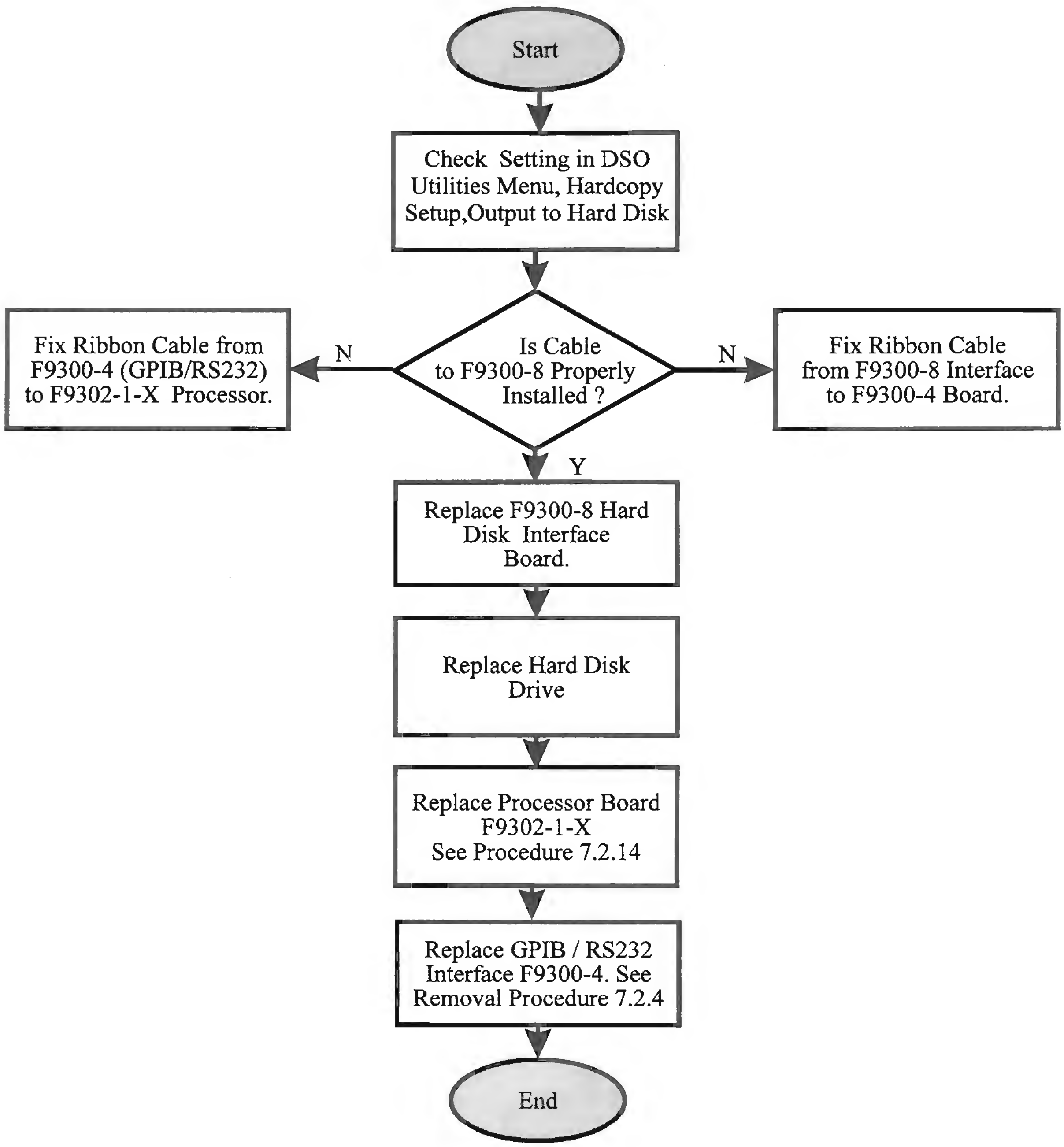
7.5.12 Graphic Printer Fails



7.5.13 Centronics Fails



7.5.14 Hard Disk Fails



7.6 Calibration Procedures

The following section includes the adjustments required for the power supply, front end and display. It is recommended that they be verified at one year intervals.

7.6.1 PS9351 Power Supply Calibration

The four voltages are adjustable by ± 5% of the nominal value.

The reference for the measurements are the pins on top of connector J1 connected to the main board F9354-31.

For the power supply calibration proceed as follow:

- Turn off the power
- Remove the top cover (7.2.1)
- Remove the front frame assembly (7.2.9) and put it to the right of the unit.

- By using two extension cables, reconnect the processor board to the front panel (J4) and to the deflection board (J6).

- Once the top cover is removed and the front panel is disassembled from the scope, extra cooling of the main board is required. It's mandatory to disconnect the existing Fan from connector J3, located on F9354-31 card, and to use a Fan with the air flow oriented to the front end section of the board.

- The front frame assembly is now reconnected to the processor through the extension cables.

- Turn on the power, set the scope to Auto Trigger, and perform the adjustments to get on J1 (see figure 7. 7).

Pin 4, 5, 6	:	**+ 5.12 V** (Min = + 5.05 V, Max = + 5.15 V)
Pin 9, 10, 11	:	**- 5.2 V** (Min = - 5.15 V, Max = - 5.25 V)
Pin 12	:	**+15 V** (Min = +14.9 V, Max = +15.1 V)
Pin 14	:	**- 15 V** (Min = -14.9 V, Max = -15.1 V)
Pin 3, 7, 8, 13	:	**Ground**

The four potentiometers are accessible from the right side through holes in the PS9351 power supply chassis.

- Turn the potentiometer clockwise to increase the tension or counterclockwise to decrease the voltage. When the adjustment is done, stop the acquisition by depressing the stop trigger push button, and verify that there is no large difference on the + 5.12 V, typically less than 80 mV.

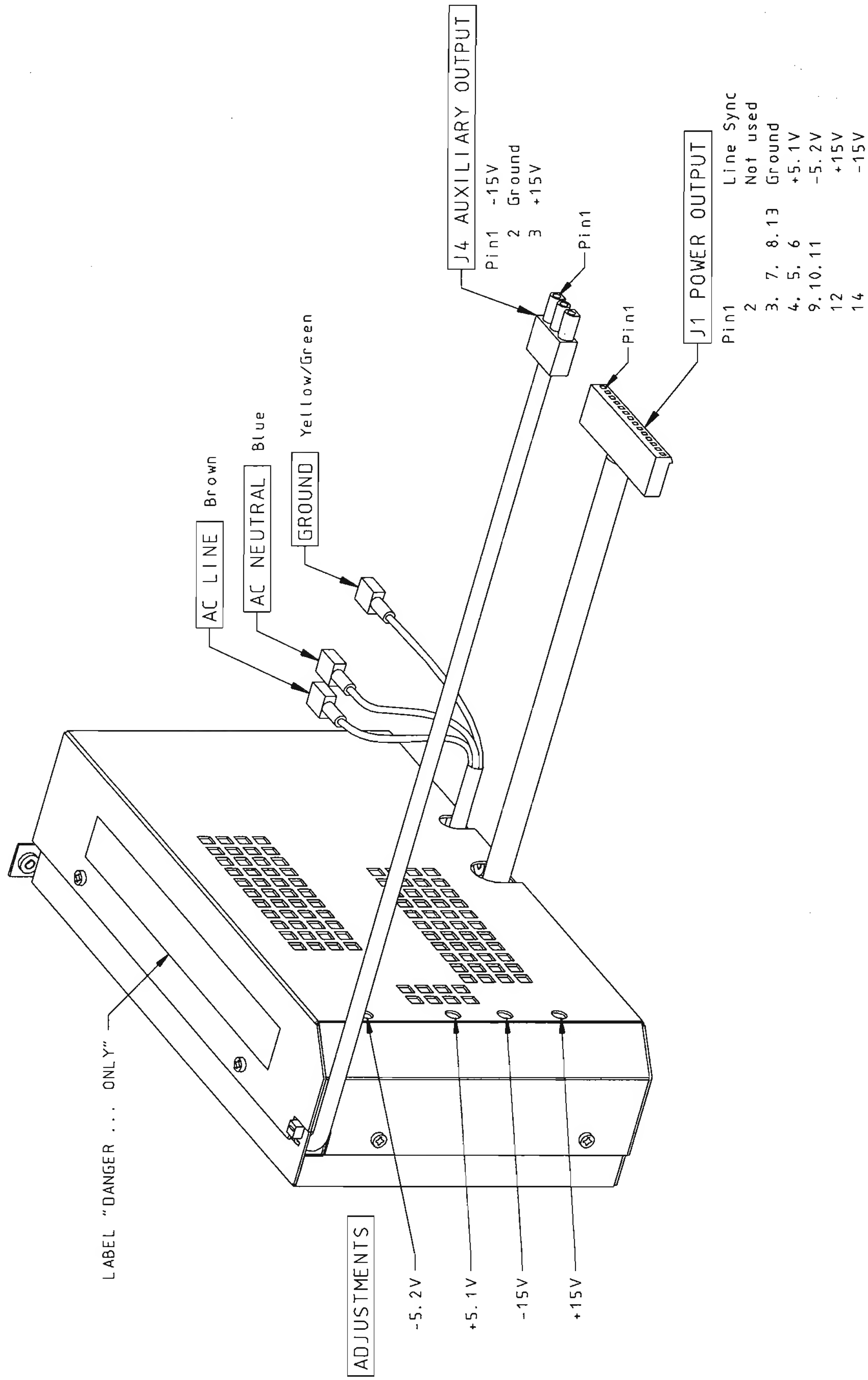


Figure 7.7 : PS9351 Power Supply

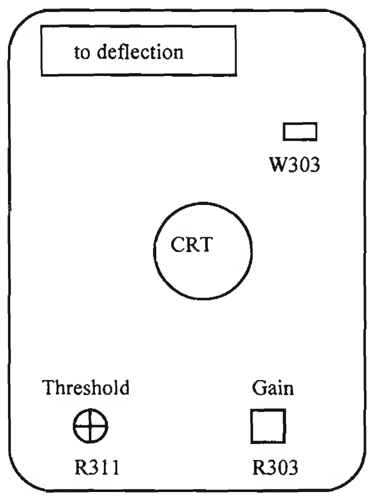
7.6.2 93XX-Display Adjustment Procedure

7.6.2.1 Introduction

There is a total of 12 potentiometers or variable coils to adjust the deflection and video board.

Video: (2 adjustments)

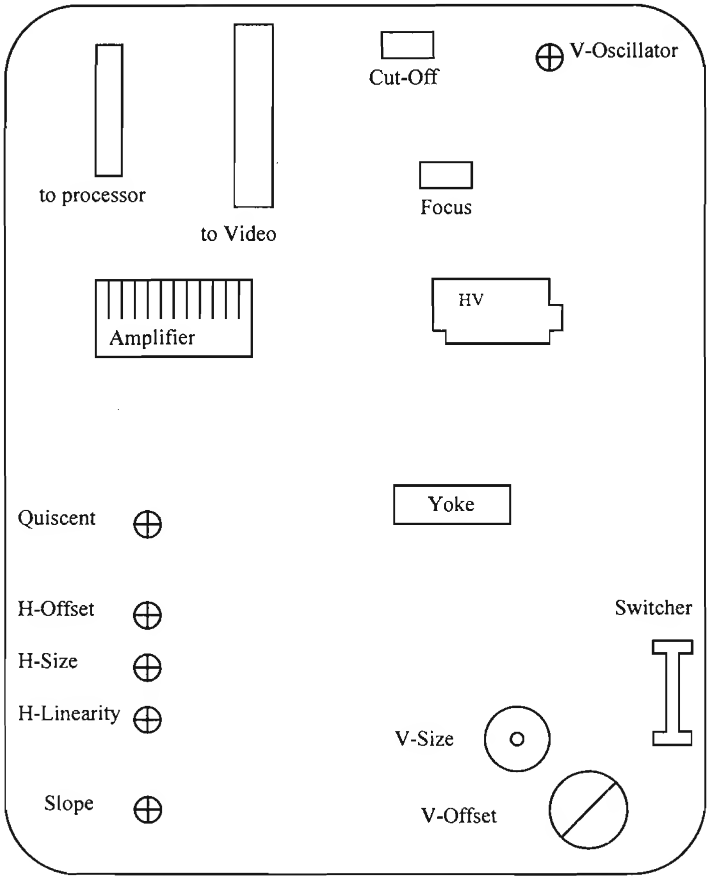
- Threshold : **Level of the video board.**
- Gain : **Intensity of the screen.**



Video board component side

Deflection : (10 adjustments)

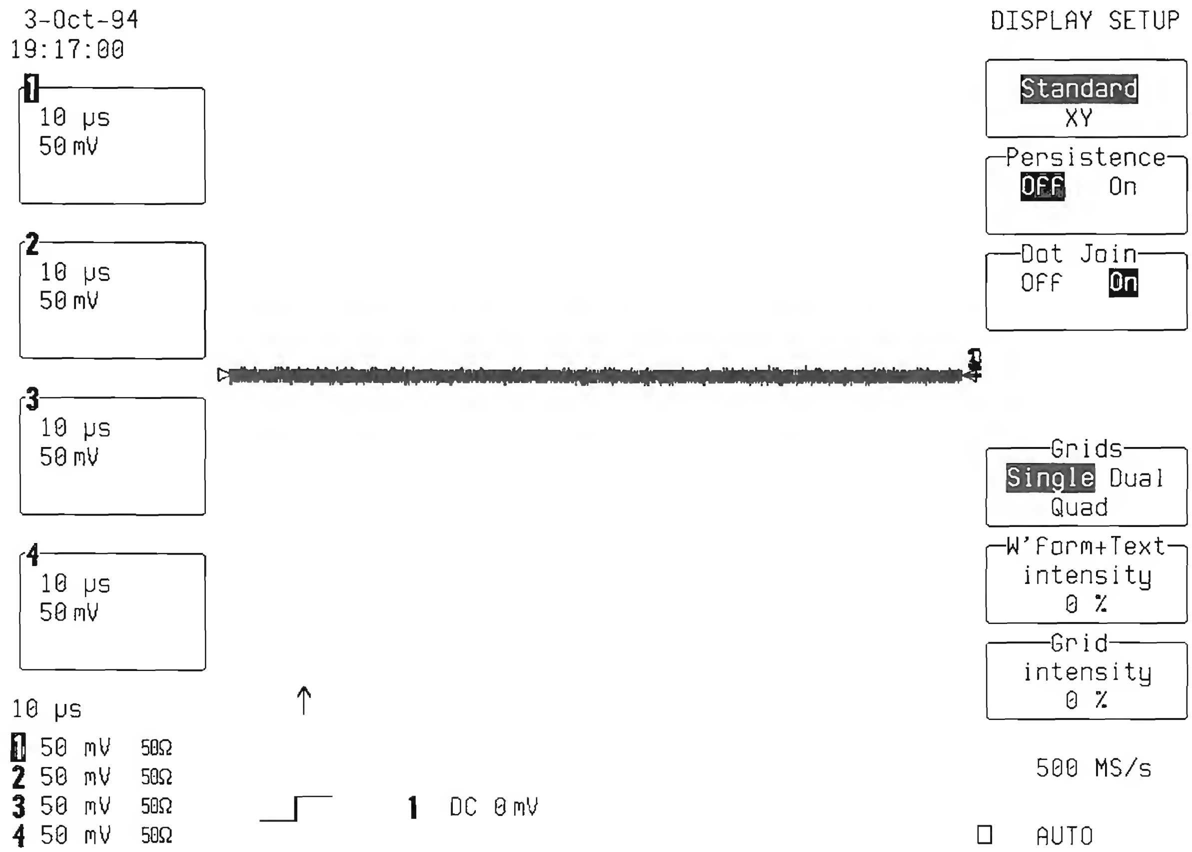
- Vosc : **Frequency of the vertical oscillator.**
- Slope : **Speed of the horizontal ramp.**
- Focus : **Focus of the screen.**
- Cut off : **Cathode ray tube cut off.**
- Quiescent : **Standby current of the horizontal deflection amplifier.**
- H Linearity : **Horizontal linearity.**
- H Size : **Horizontal size** (Max 165mm).
- H Offset : **Horizontal position.**
- V Size : **Vertical size** (Max 120mm).
- V Offset : **Vertical position.**



Deflection board component side

7.6.2.2 Coarse Adjustment

- Depress display button.
- Set W'form + text intensity to 0%.
- Set grid intensity to 0%
- Turn fully clockwise the intensity potentiometer on the video board.
- On the video board connect a digital multimeter on test point : W303
- Adjust threshold potentiometer to get 2 V ± 0.1 V on W303.



- Set W'form intensity to 100%.
- Set grid intensity to 60%.

- Adjust H-size, H-offset, V-size, V-offset to center the image in the screen.
  The vertical position should be adjusted to get the push buttons of the front panel in front of the software menus, use the utilities set up.
  The small magnets mounted on the deflection yoke influence the vertical position.

- Turn the quiescent potentiometer clockwise until the default of the horizontal lines just disappears from the vertical center of the screen.

- Increase the cut off until a vertical line appears on the right side of the screen.

- Adjust the slope potentiometer to get 5mm gap between the highlighted vertical line and the right border of the selection menus.

- Adjust H-linearity to get the best linearity.

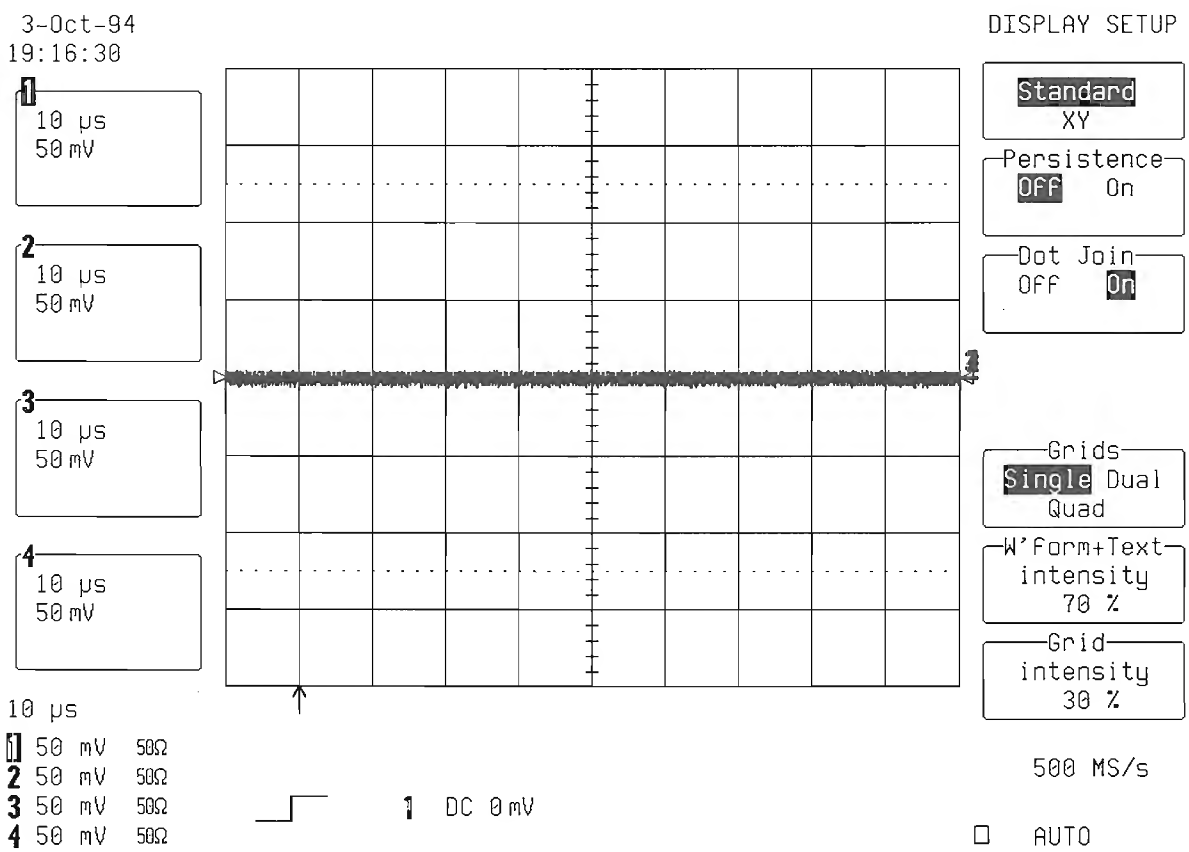
7.6.2.3 Fine Adjustment

The final adjustment of the intensity, cut off, and focus must be made in a dark room.

- Set W'form intensity to 30%.
- Set grid intensity to 0%.
- Adjust the cut off potentiometer until the highlighted vertical line disappears from the right side of the screen.

- Set W'form intensity to 20%.
- Display four traces.
- On the video board adjust the gain potentiometer (intensity) in order to get the text just readable.

- Set W'form + text intensity to 70%.
- Set grid intensity to 30%



- Adjust the focus (usually fully clockwise) for most uniform focus over the entire screen.

- In a standard luminosity environment set W'form + text to 90%, and grid intensity to 60%.

- Verify the intensity, focus, and contrast adjustment, for best definition of the displayed text.

CAUTION

Never change the Vosc calibration.

7.6.3 Front End Test and Calibration Procedure

7.6.3.1 Introduction

The adjustments describe in the following calibration procedure require extension of the front panel assembly out of the scope, using two flat cables.
In order to access the front end potentiometers and variable caps located underneath the Cathode Ray tube and deflection board, dismount the front panel assembly from the scope and reconnect it to the processor board connectors J4 and J6, using the extension cable set.
Once the top cover is removed and the front panel is disassembled from the scope, extra cooling of the main board is required. It's mandatory to disconnect the existing Fan from connector J3, located on F9354-31 card, and to use a Fan with the air flow oriented to the front end section of the board.

7.6.3.2 Power Supplies

Remove the upper shield to access the test point TP203. Use a high precision DMM.

7.6.3.2.1 Front End Power Supply Verification

- Check on test point the following tensions :

TP203

10	9
8	7
6	5
4	3
2	1

Front of DSO

- Pin 1 and Pin 2 : Ground

- + 12 VFEP : pin 6 (+) = + 12 Volt ± 2% : if problem troubleshoot regulator A204
- + 12 VFE : pin 3 (+) = + 12 Volt ± 2% : if problem troubleshoot regulator A210
- + 8 VFE : pin 5 (+) = + 8 Volt ± 2% : if problem troubleshoot regulator A216
- - 12 VFEP : pin 7 (-) = - 12 Volt ± 2% : if problem troubleshoot regulator A209
- - 12 VFE : pin 4 (-) = - 12 Volt ± 2% : if problem troubleshoot regulator A203
- - 8 VFE : pin 8 (-) = - 8 Volt ± 2% : if problem troubleshoot regulator A213

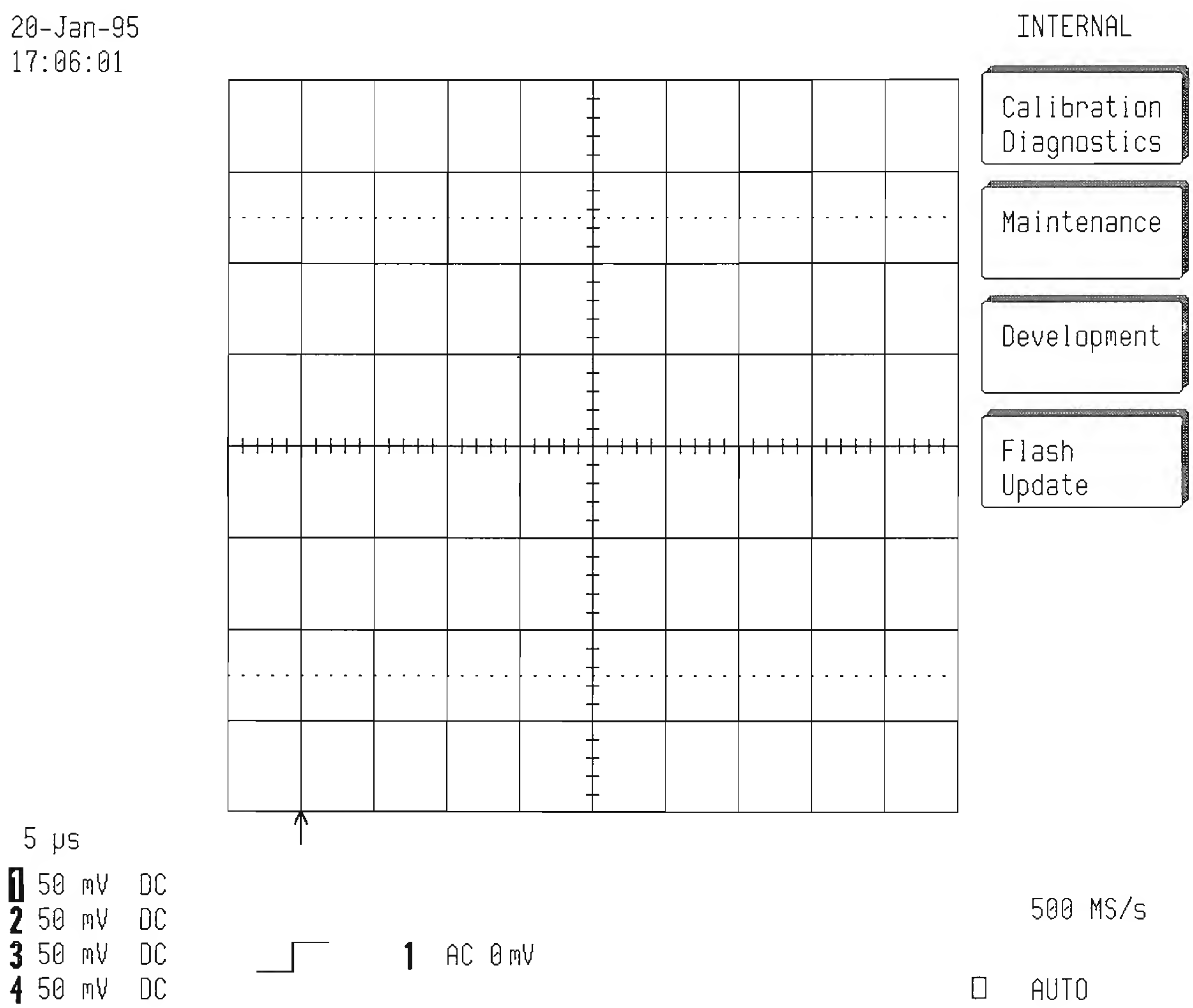
7.6.3.2.2 ADC Power Supply Verification

- Check on test point TP203 the following tensions :

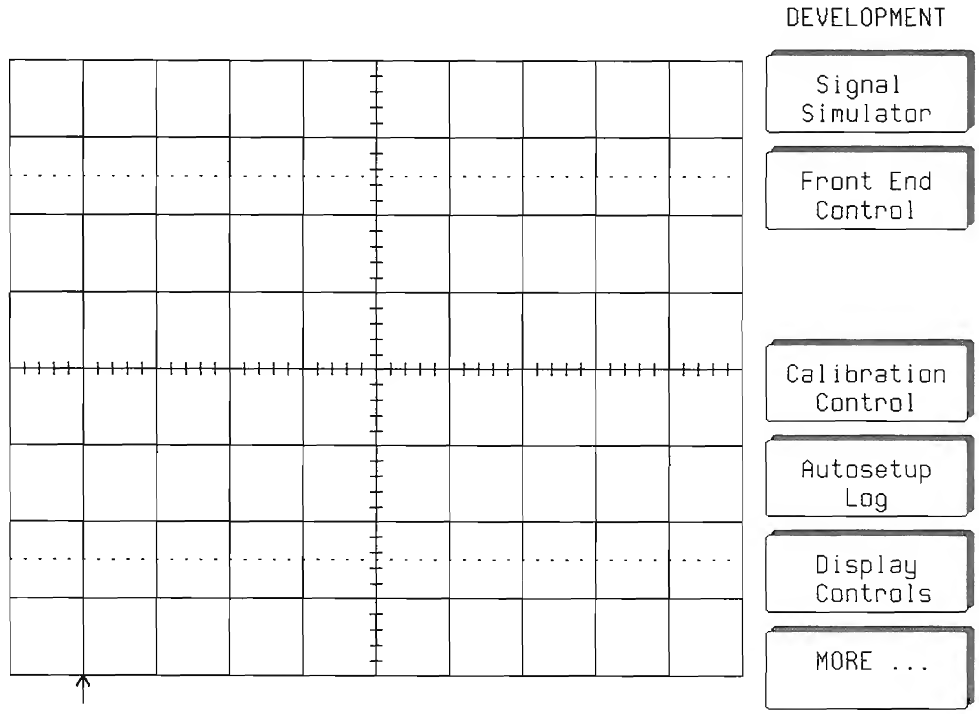
- + 12 VADC : pin 9 (+) = + 12 Volt ± 2% : if problem troubleshoot regulator A402
- - 12 VADC : pin 10 (-) = - 12 Volt ± 2% : if problem troubleshoot regulator A400
- + 7 VADC : A403 pin 3 = + 7 Volt ± 2% : if problem troubleshoot regulator A403

7.6.3.3 16 bit DAC Verification

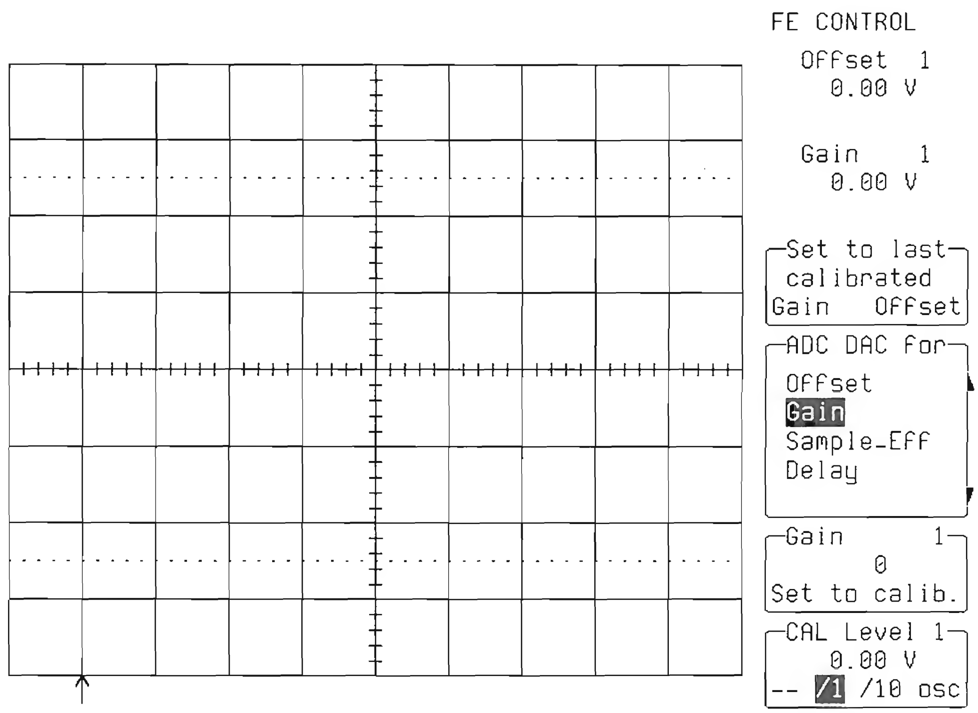
- Select Channel 1, Channel 2, Channel 3 and Channel 4 : Coupling DC 1 MΩ
- Enter in the internal calibration diagnostics by simultaneously depressing the third and fourth push buttons, and then by depressing the fifth.
- Select Development menu



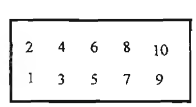
- Select Front End Control menu



- Set Cal Level : /1 and 0,00 V

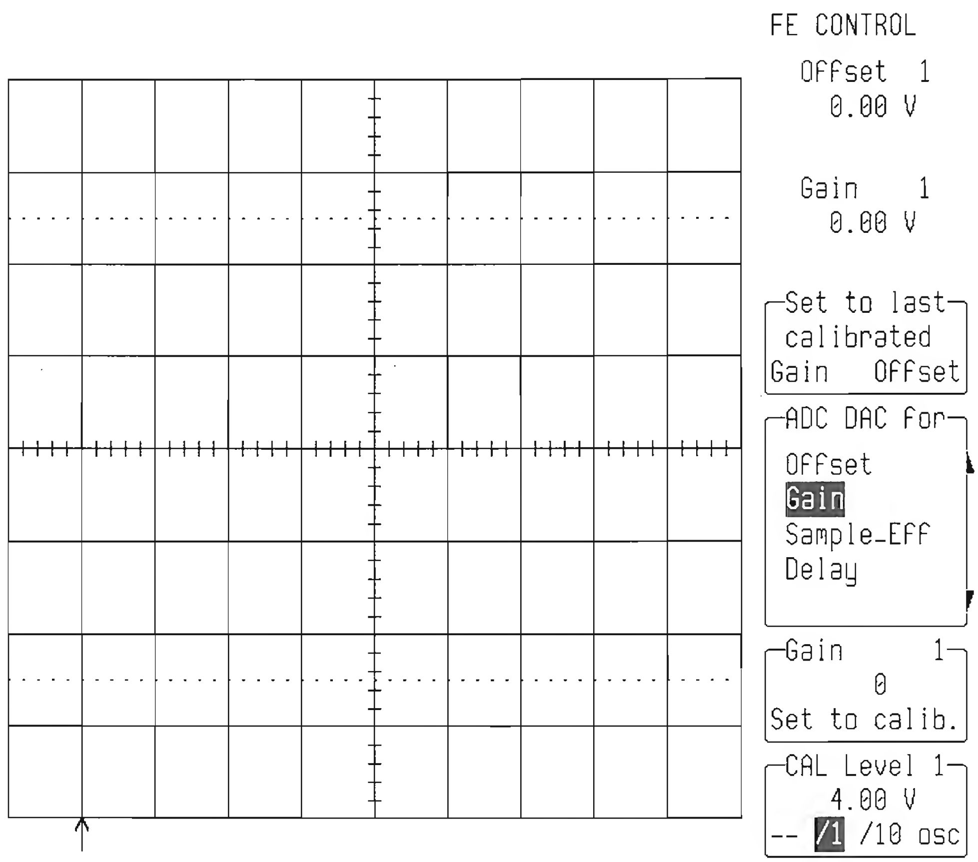


- Check that we get on pin 5 (+) of TP201 : 0.00 mV ± 0.1 mV



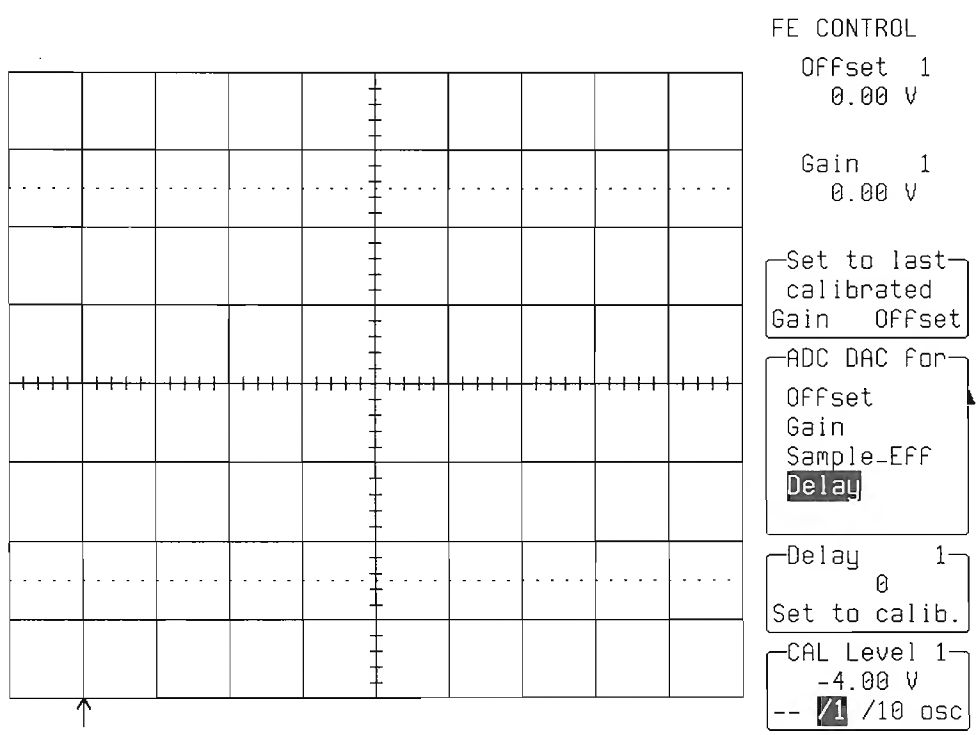
Front of DSO

- Set Cal Level : /1 and + 4.00 V (use front panel potentiometer)

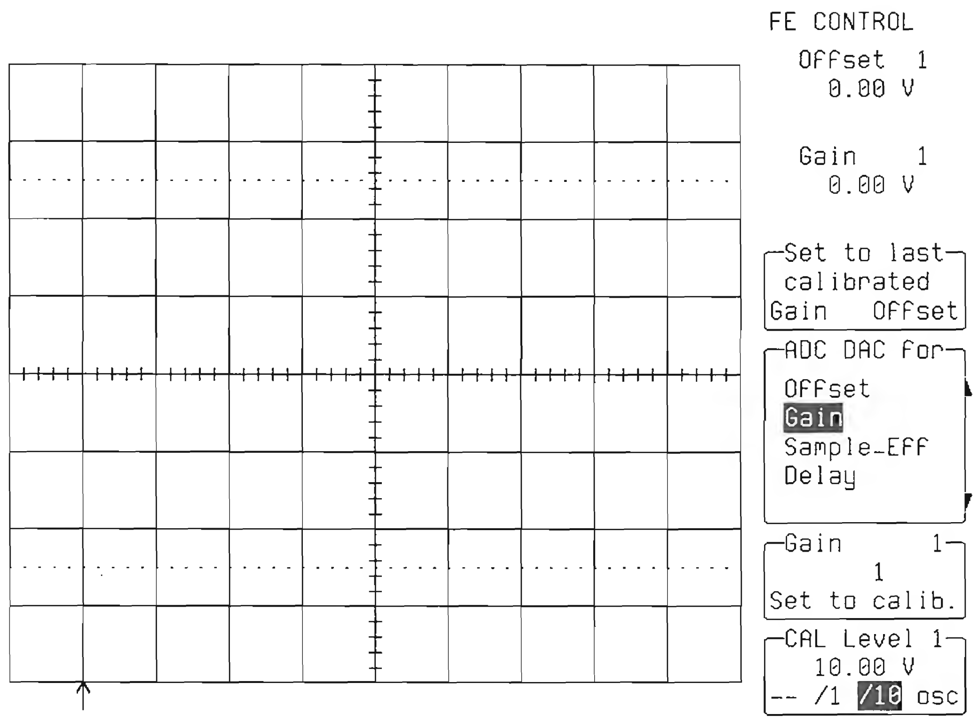


- Check that we get on pin 5 (+) of TP201 : 1.00 V ± 1%

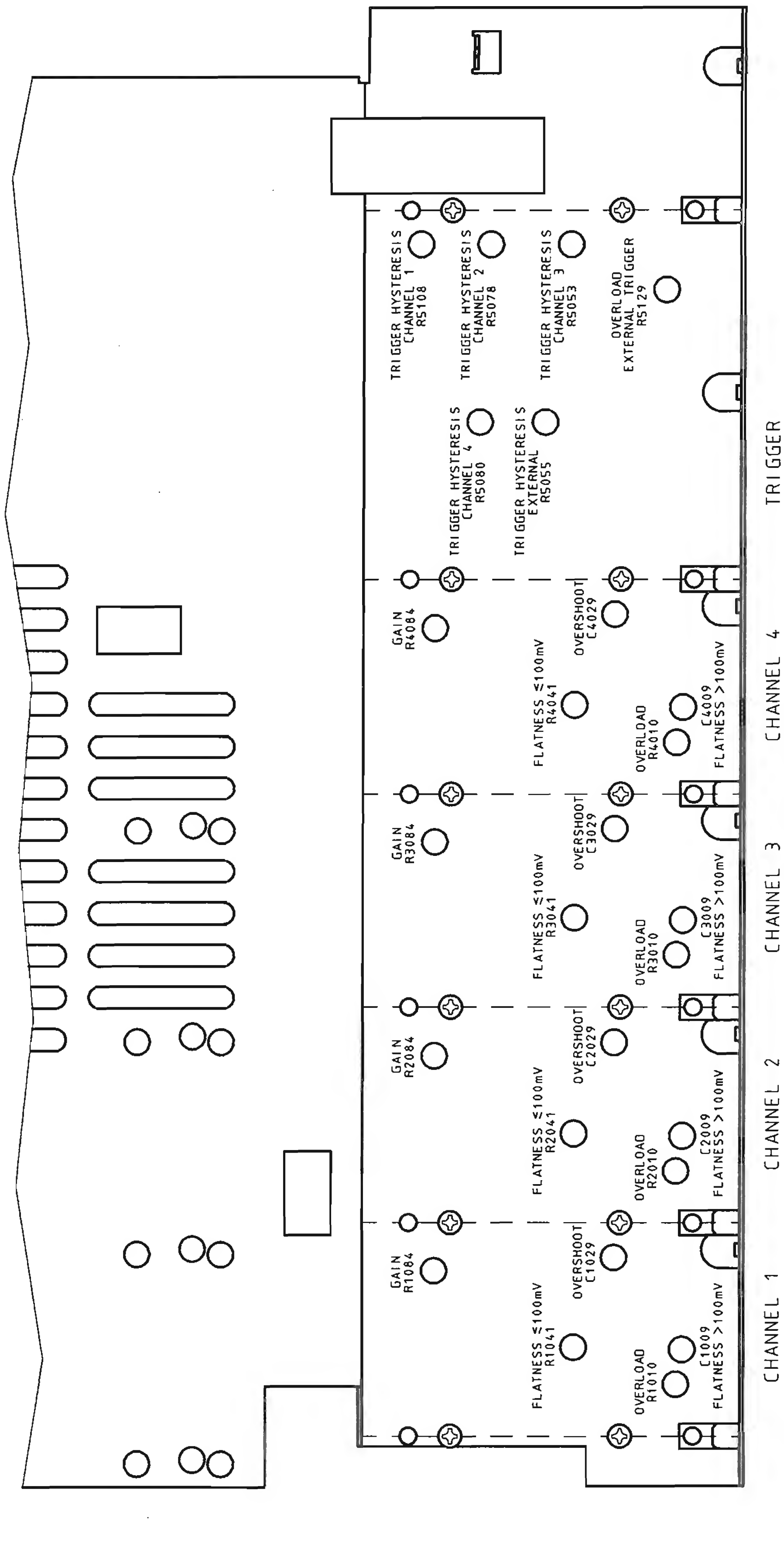
- Set Cal Level : /1 and - 4.00 V (use front panel potentiometer)



- Check on pin 5 (+) of TP201 that we get - 1.00 V ± 1%
- Set Cal Level : /10 and + 10.00 V (use front panel potentiometer)



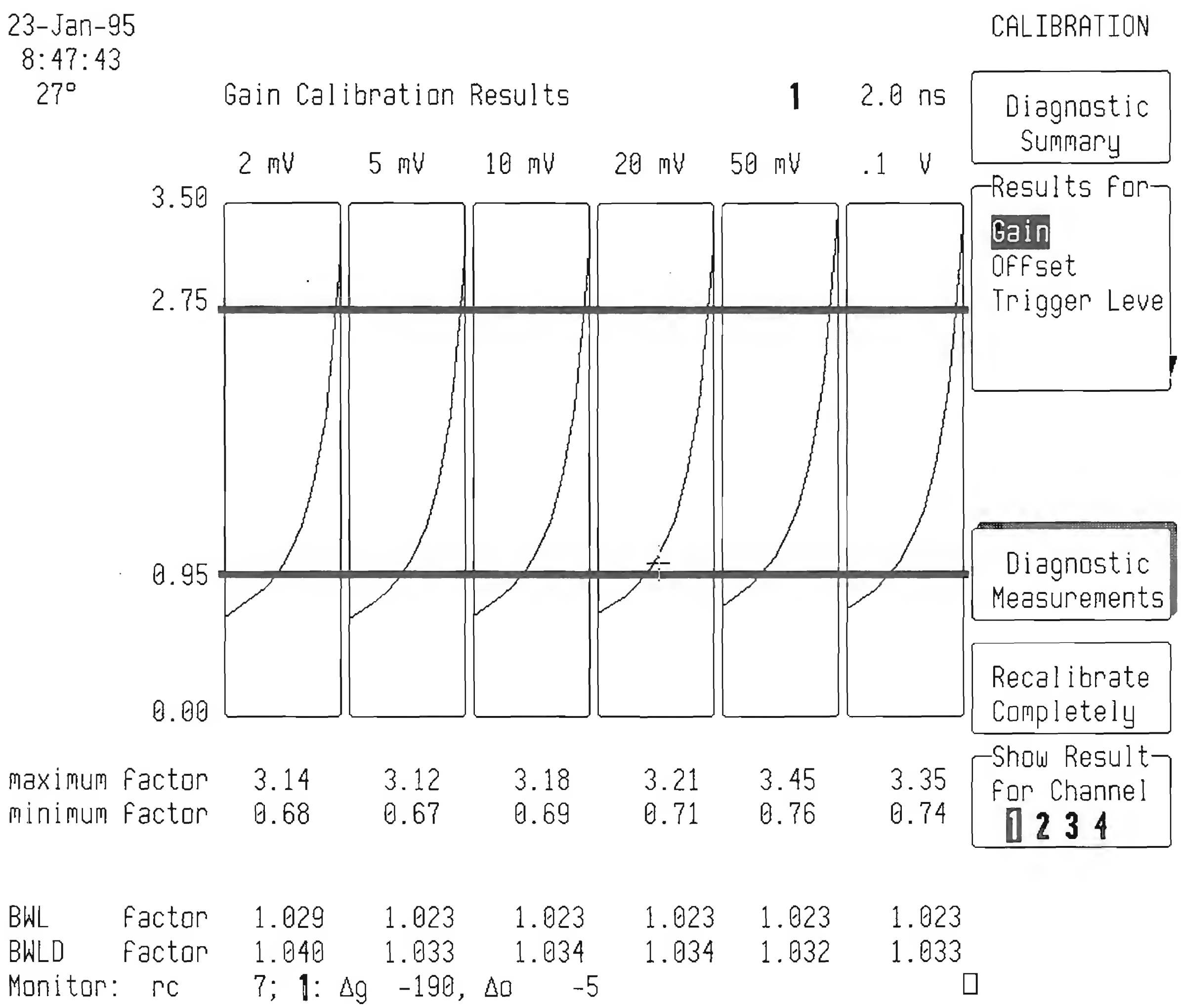
- Check on pin 5 (+) of TP201 that we get + 0.25 V ± 1%
- Set Cal Level : /10 and - 10.00 V (use front panel potentiometer)
- Check on pin 5 (+) of TP201 that we get - 0.25 V ± 1%


TRIGGER HYSTERESIS CHANNEL 1 R5108
TRIGGER HYSTERESIS CHANNEL 2 R5078
TRIGGER HYSTERESIS CHANNEL 3 R5053
OVERLOAD EXTERNAL TRIGGER R5129
TRIGGER HYSTERESIS CHANNEL 4 R5080
TRIGGER HYSTERESIS EXTERNAL R5055
TRIGGER
GAIN R4084
OVERSHOOT C4029
FLATNESS ≤100mV R4041
OVERLOAD R4010
C4009 FLATNESS >100mV
CHANNEL 4
GAIN R3084
OVERSHOOT C3029
FLATNESS ≤100mV R3041
OVERLOAD R3010
C3009 FLATNESS >100mV
CHANNEL 3
GAIN R2084
OVERSHOOT C2029
FLATNESS ≤100mV R2041
OVERLOAD R2010
C2009 FLATNESS >100mV
CHANNEL 2
GAIN R1084
OVERSHOOT C1029
FLATNESS ≤100mV R1041
OVERLOAD R1010
C1009 FLATNESS >100mV
CHANNEL 1

7.6.3.4 Input Buffer DC Gain Adjustment

7.6.3.4.1 Channel 1 DC Gain Adjustment

- In the Calibration Diagnostics select Diagnostics Results.
- Select Results for Gain, and Show Result for Channel 1
- Push Recalibrate Completely



- Adjust Potentiometer R1084 to get :

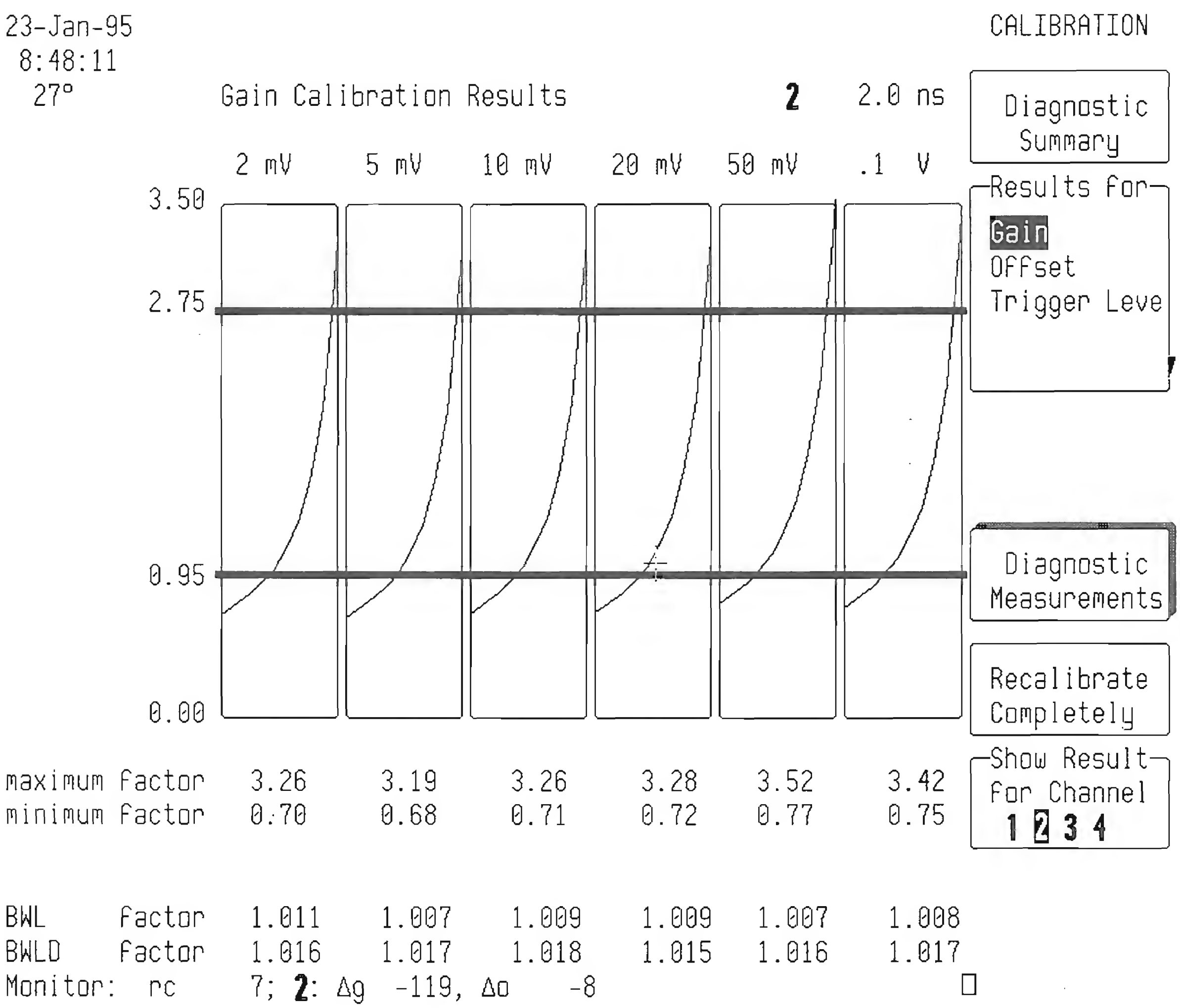
Maximum Factor at 5 mV/div > 2.90

Minimum Factor at 50 mV/div < 0.85

- During the adjustment, push recalibrate completely .

7.6.3.4.2 Channel 2 DC Gain Adjustment

- In the Calibration Diagnostics select Diagnostics Results.
- Select Results for Gain, and Show Result for Channel 2
- Push Recalibrate Completely



- Adjust Potentiometer R2084 to get :

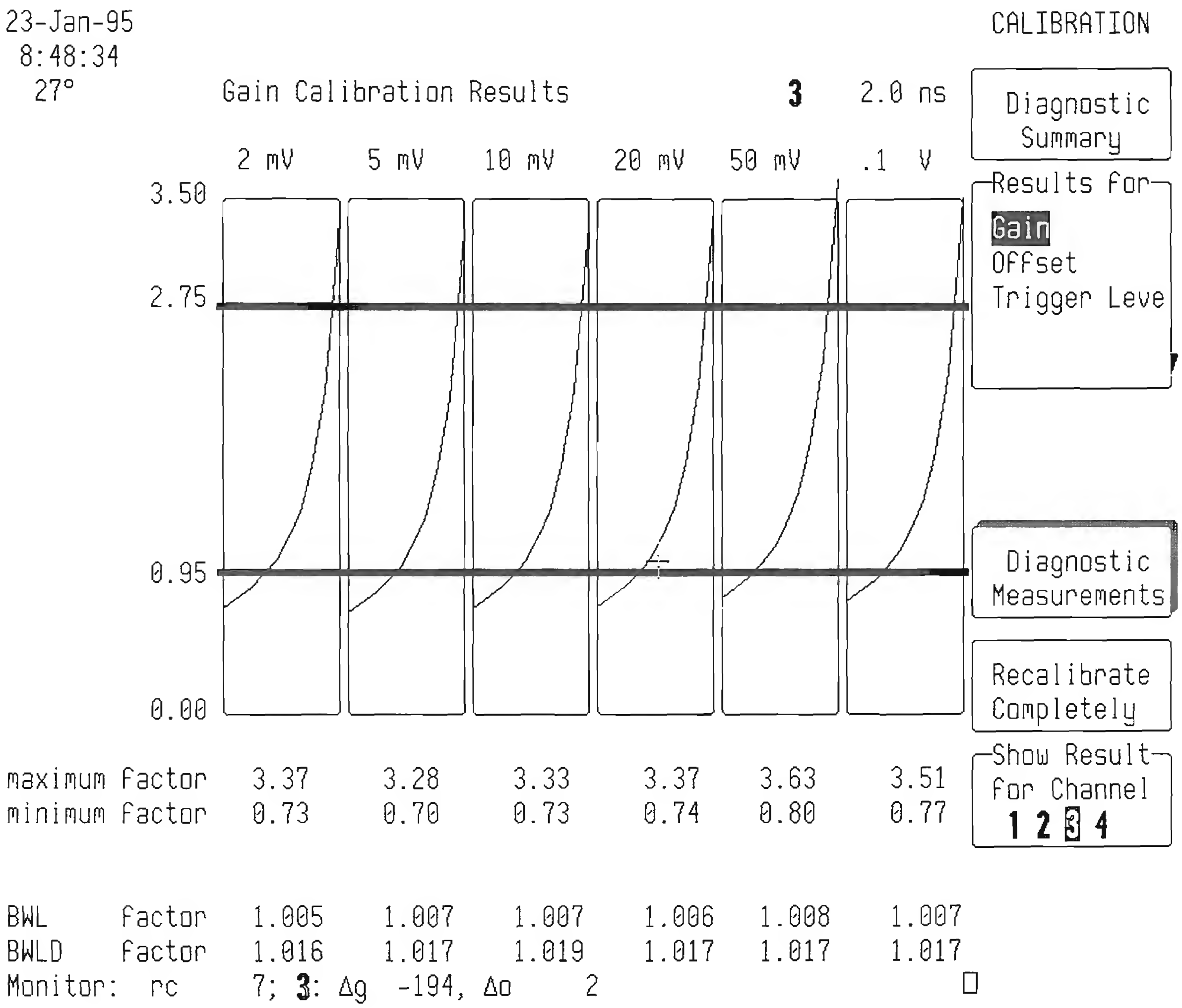
Maximum Factor at 5 mV/div > 2.90

Minimum Factor at 50 mV/div < 0.85

- During the adjustment, push recalibrate completely .

7.6.3.4.3 Channel 3 DC Gain Adjustment

- In the Calibration Diagnostics select Diagnostics Results.
- Select Results for Gain, and Show Result for Channel 3
- Push Recalibrate Completely



- Adjust Potentiometer R3084 to get :

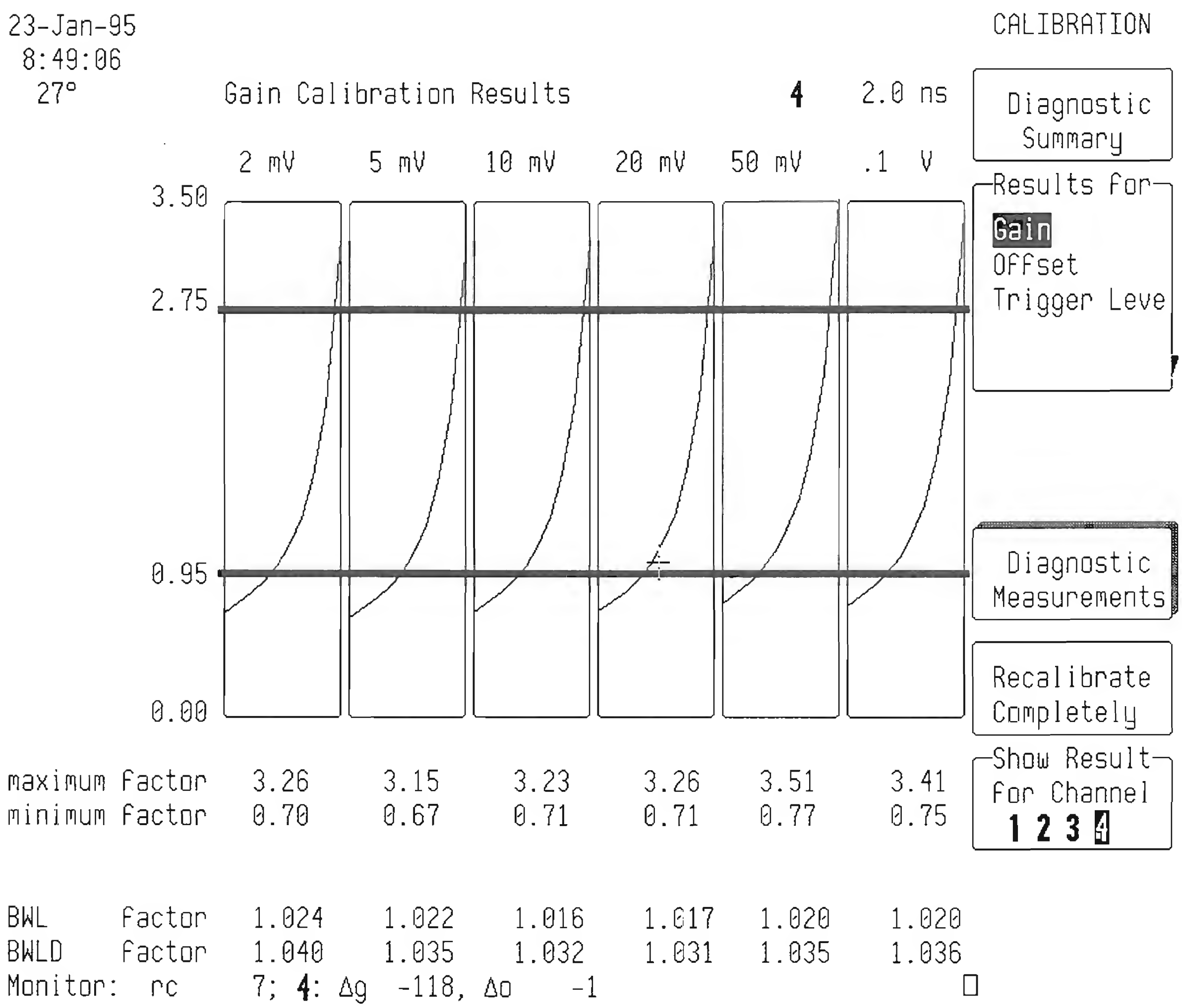
  Maximum Factor at 5 mV/div > 2.90

  Minimum Factor at 50 mV/div < 0.85

- During the adjustment, push recalibrate completely .

7.6.3.4.4 Channel 4 DC Gain Adjustment

- In the Calibration Diagnostics select Diagnostics Results.
- Select Results for Gain, and Show Result for Channel 4
- Push Recalibrate Completely



- Adjust Potentiometer R4084 to get :

Maximum Factor at 5 mV/div > 2.90

Minimum Factor at 50 mV/div < 0.85

- During the adjustment, push recalibrate completely

7.6.3.5 Overshoot and Rise time Adjustment

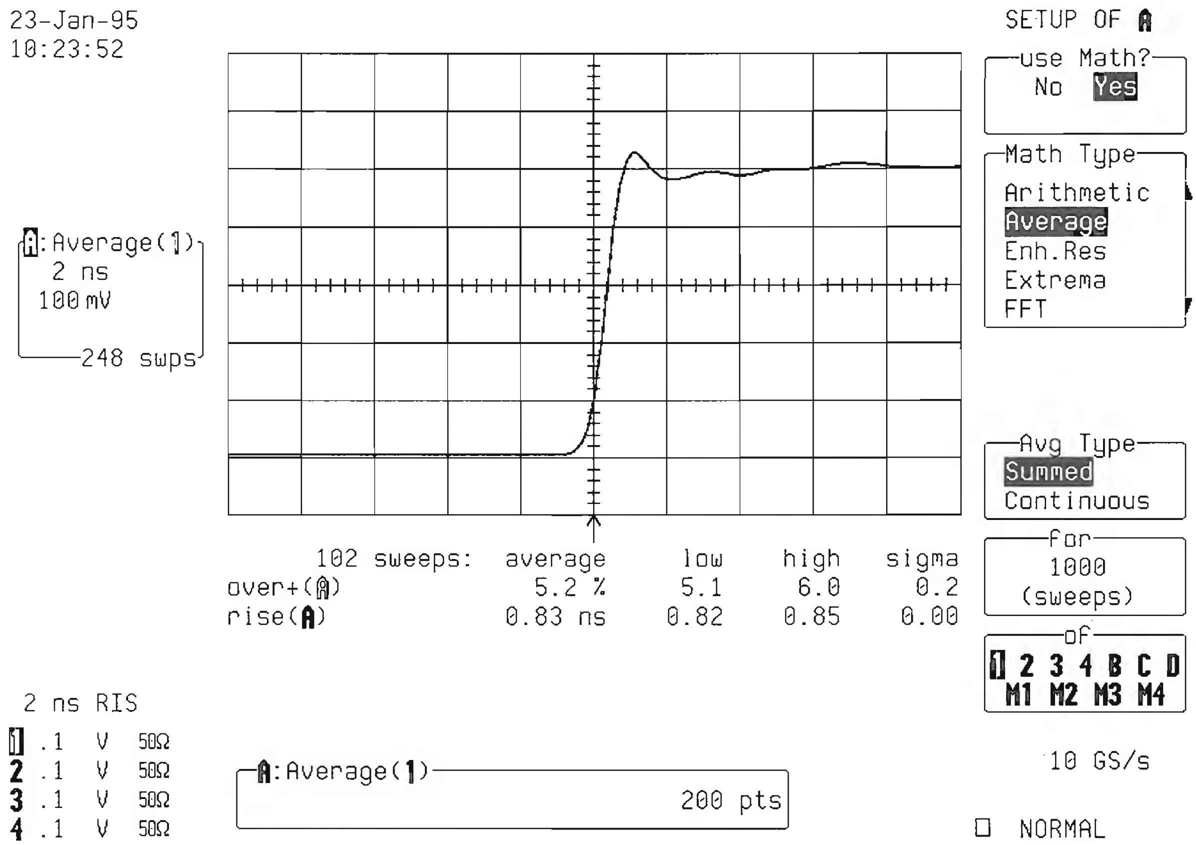
7.6.3.5.1 Channel 1 Overshoot and Rise time Adjustment

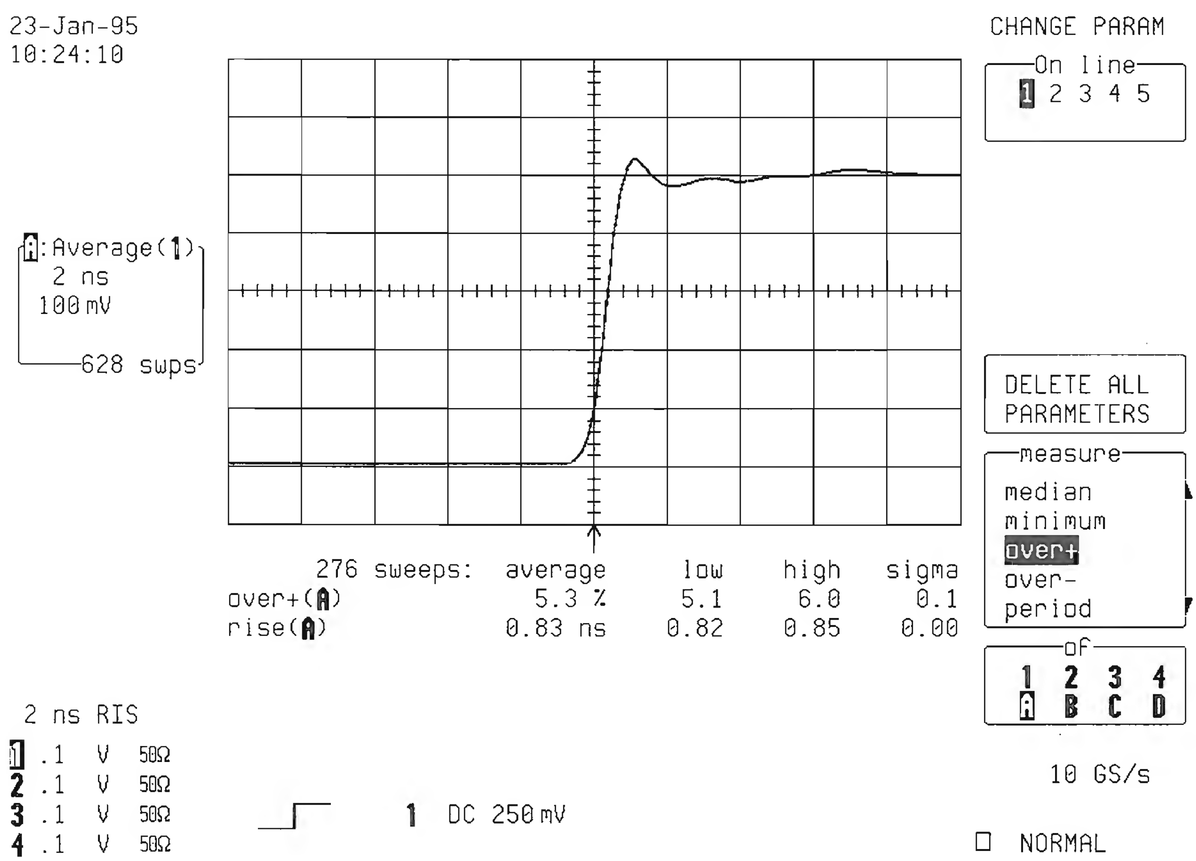
- Apply the fast Rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 1.

- Turn on trace : Ch1
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Coupling Channel 1 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div
- Trigger setup : Edge
- Trigger on : 1
- Trigger level : DC 250 mV
- Coupling 1 : DC
- Slope 1 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 2 nsec/div
- Record up to : 50K samples
- Delay : 50 % Pre-Trigger
- Turn on trace : A
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine A
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 1
- Turn off trace : Channel 1
- Cursors/Measure : Parameters
- Mode : Custom
- Statistics : on
- Change Parameters :
- on displayed trace : A
- On line 1 :
- Measure : Over + of A
- On line 2 :
- Measure : Rise of A

- Adjust C1029 to get : Over + (A) = + 5.5 % , ± 3 %

- Check that Rise time is less than 0.9 nsec


23-Jan-95
10:23:52
A: Average(1)
2 ns
100 mV
248 swps
102 sweeps: average low high sigma
over+(A) 5.2 % 5.1 6.0 0.2
rise(A) 0.83 ns 0.82 0.85 0.00
2 ns RIS
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
A: Average(1)
200 pts
SETUP OF A
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 B C D
M1 M2 M3 M4
10 GS/s
NORMAL


23-Jan-95
10:24:10
A: Average(1)
2 ns
100 mV
628 swps
276 sweeps: average low high sigma
over+(A) 5.3 % 5.1 6.0 0.1
rise(A) 0.83 ns 0.82 0.85 0.00
2 ns RIS
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
1 DC 250 mV
CHANGE PARAM
On line
1 2 3 4 5
DELETE ALL
PARAMETERS
measure
median
minimum
over+
over-
period
of
1 2 3 4
A B C D
10 GS/s
NORMAL

7.6.3.5.2 Channel 2 Overshoot and Rise time Adjustment

- Apply the fast Rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 2.

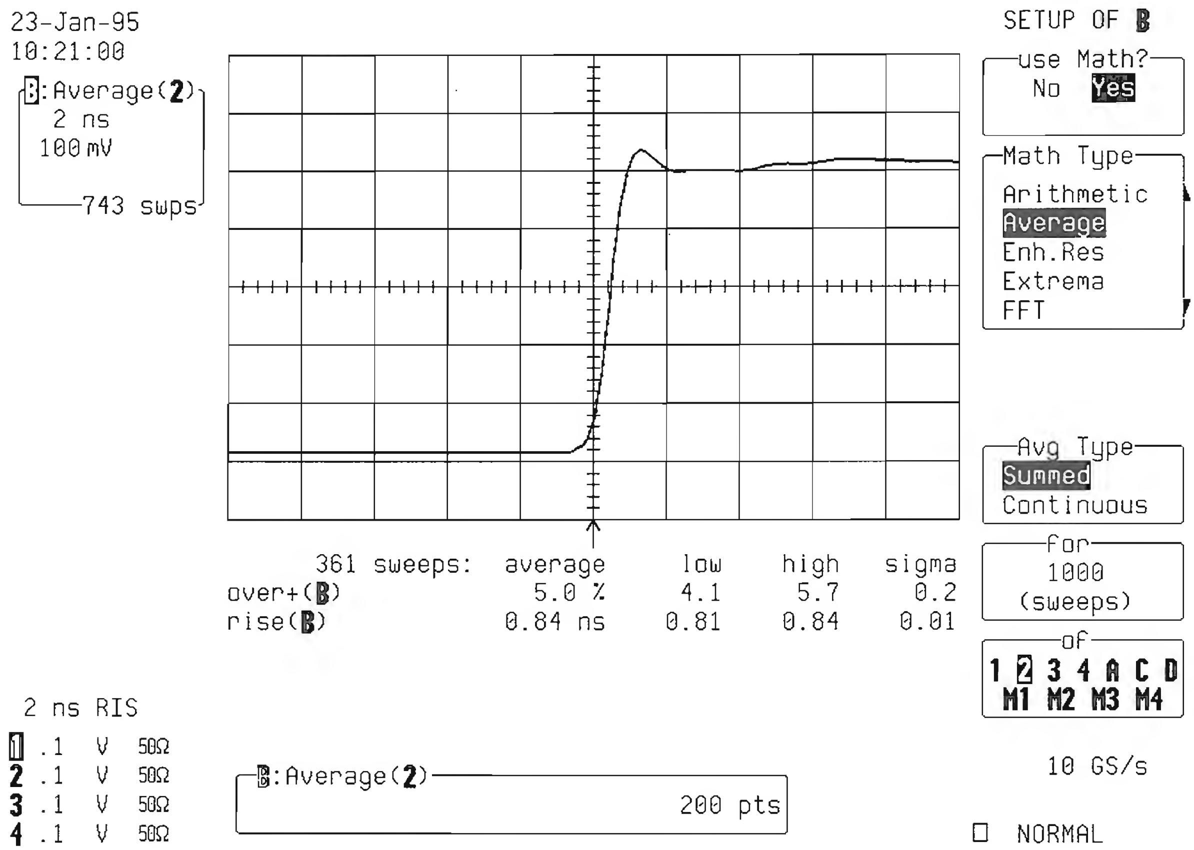
- Turn on trace : Ch2
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Coupling Channel 2 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div
- Trigger setup : Edge
- Trigger on : 2
- Trigger level : DC 250 mV
- Coupling 2 : DC
- Slope 2 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 2 nsec/div
- Record up to : 50K samples
- Delay : 50 % Pre-Trigger
- Turn on trace : B

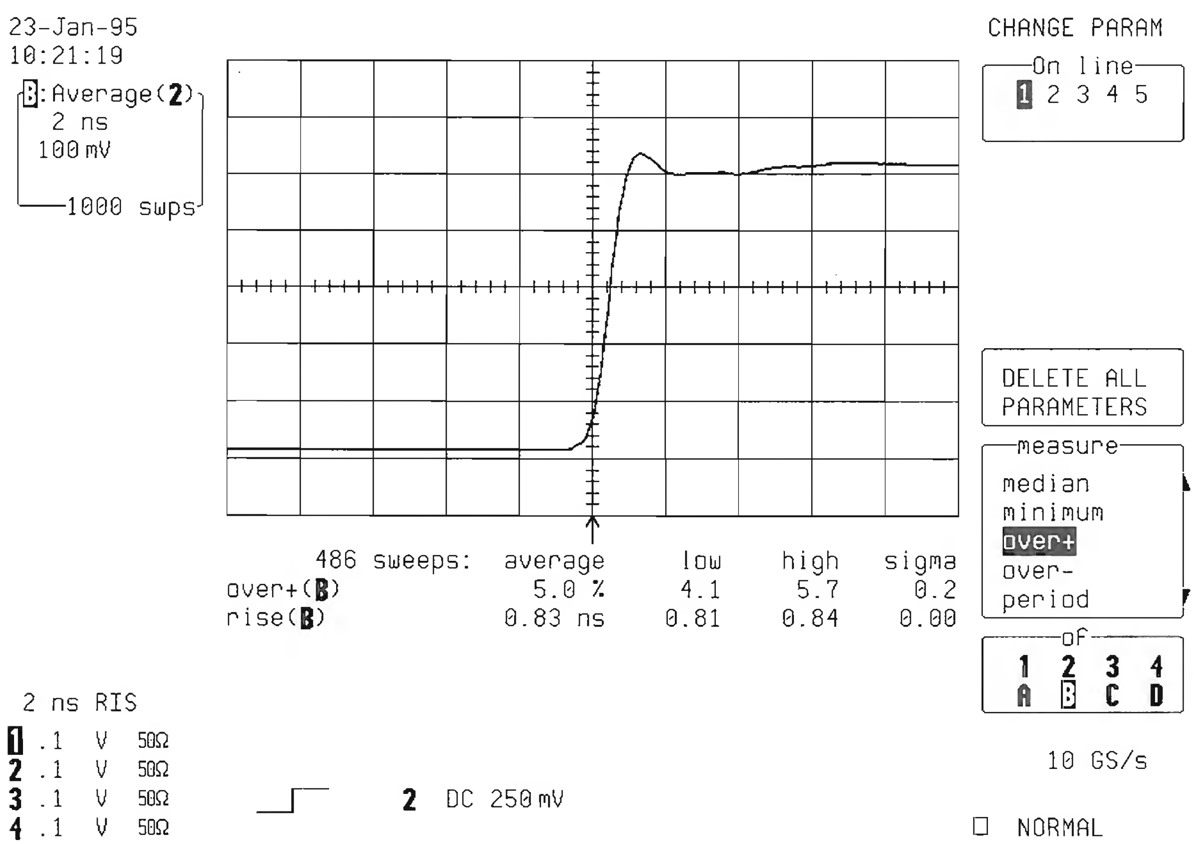
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine B
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 2
- Turn off trace : Channel 2

- Cursors/Measure : Parameters
- Mode : Custom
- Statistics : On
- Change Parameters :
- On displayed trace : B
- On line 1 :
- Measure : Over + of B
- On line 2 :
- Measure : Rise of B

- Adjust C2029 to get : Over + (B) = + 5.5 % , ± 3 %

- Check that Rise time is less than 0.9 nsec


23-Jan-95
10:21:00
B: Average(2)
2 ns
100 mV
743 swps
SETUP OF B
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 A C D
M1 M2 M3 M4
361 sweeps: average low high sigma
over+(B) 5.0 % 4.1 5.7 0.2
rise(B) 0.84 ns 0.81 0.84 0.01
2 ns RIS
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
B: Average(2)
200 pts
10 GS/s
NORMAL


23-Jan-95
10:21:19
B: Average(2)
2 ns
100 mV
1000 swps
CHANGE PARAM
On line
1 2 3 4 5
DELETE ALL
PARAMETERS
measure
median
minimum
over+
over-
period
of
1 2 3 4
A B C D
486 sweeps: average low high sigma
over+(B) 5.0 % 4.1 5.7 0.2
rise(B) 0.83 ns 0.81 0.84 0.00
2 ns RIS
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
2 DC 250 mV
10 GS/s
NORMAL

7.6.3.5.3 Channel 3 Overshoot and Rise time Adjustment

- Apply the fast Rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 3.

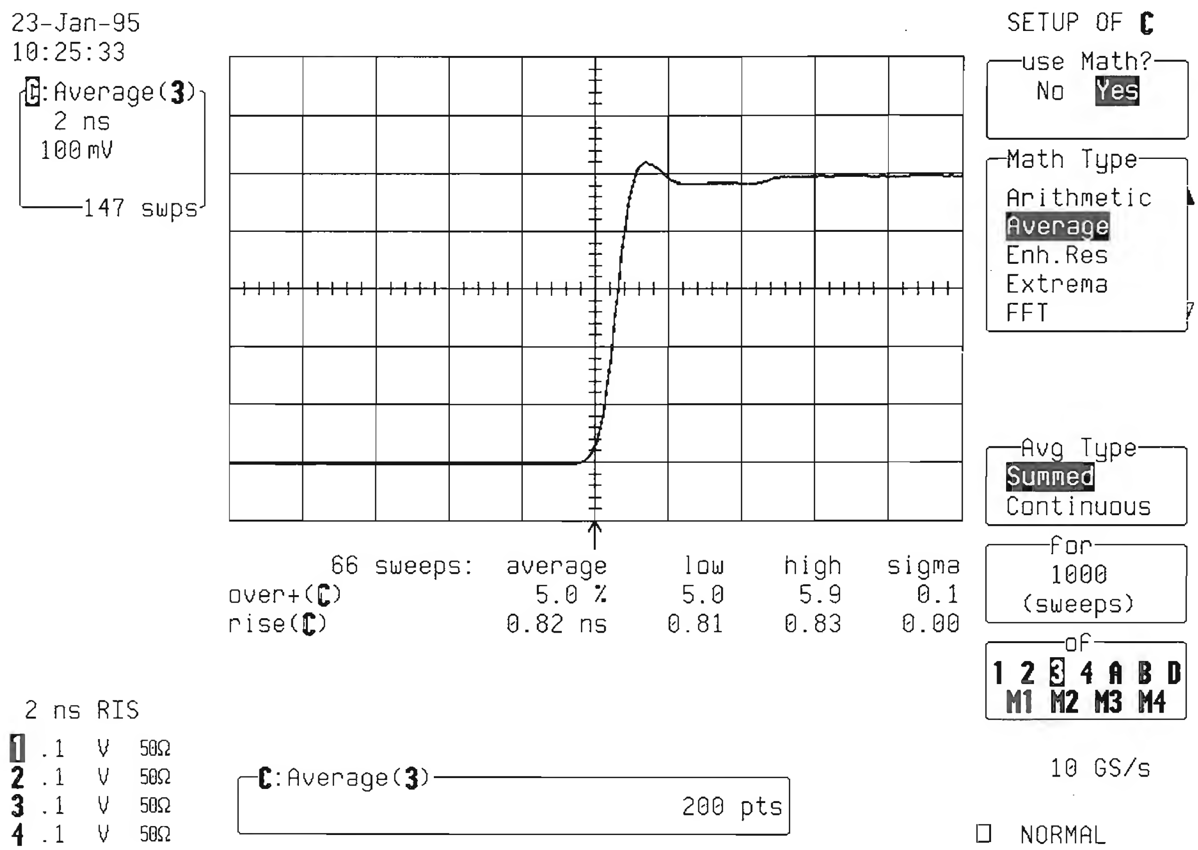
- Turn on trace : Ch3
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Coupling Channel 3 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div
- Trigger setup : Edge
- Trigger on : 3
- Trigger level : DC 250 mV
- Coupling 3 : DC
- Slope 3 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 2 nsec/div
- Record up to : 50K samples
- Delay : 50 % Pre-Trigger
- Turn on trace : C

- Select Math Setup
- For Math : Use at most 1000 points
- Redefine C
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 3
- Turn off trace : Channel 3

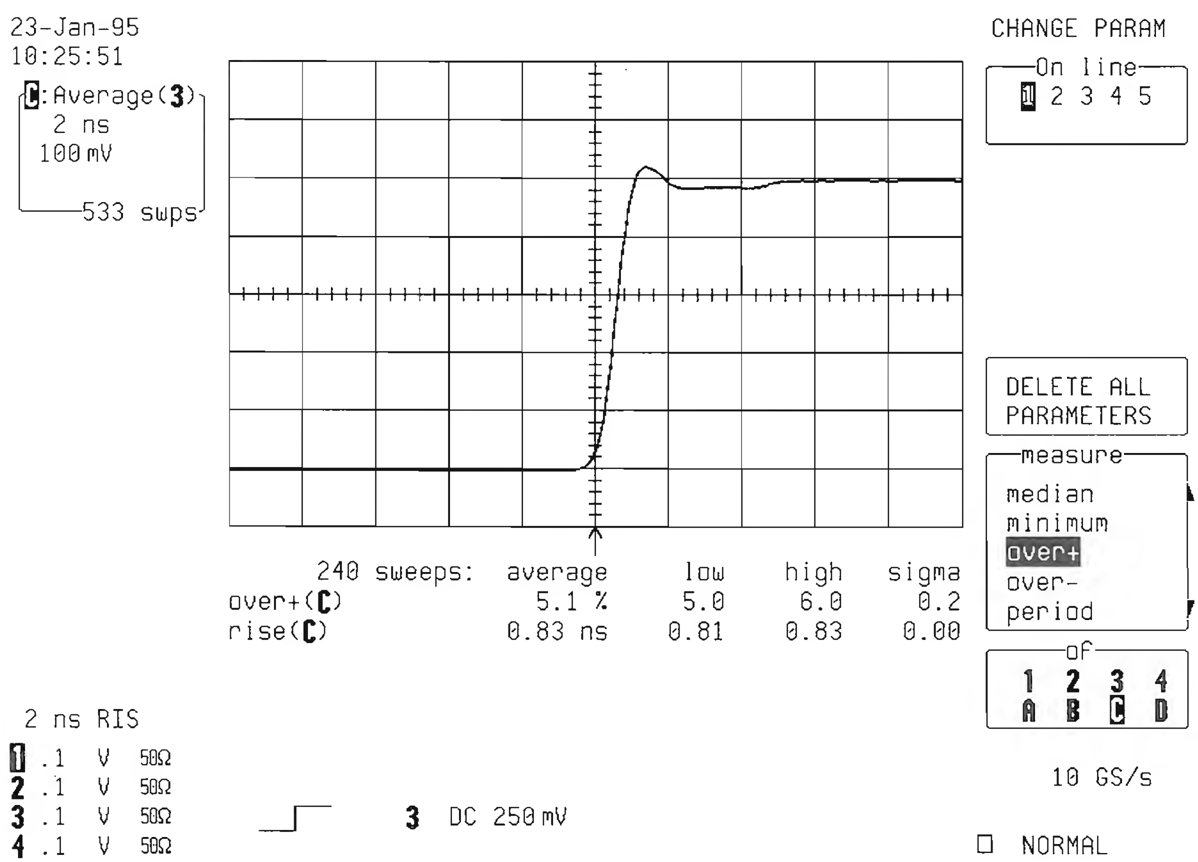
- Cursors/Measure : Parameters
- Mode : Custom
- Statistics : On
- Change Parameters :
- On displayed trace : C
- On line 1 :
- Measure : Over + of C
- On line 2 :
- Measure : Rise of C

- Adjust C3029 to get : Over + (C) = + 5.5 % , ± 3 %

- Check that Rise time is less than 0.9 nsec



23-Jan-95
10:25:33
C: Average(3)
2 ns
100 mV
147 swps
SETUP OF C
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 A B D
M1 M2 M3 M4
66 sweeps: average low high sigma
over+(C) 5.0 % 5.0 5.9 0.1
rise(C) 0.82 ns 0.81 0.83 0.00
2 ns RIS
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
C: Average(3)
200 pts
10 GS/s
NORMAL



23-Jan-95
10:25:51
C: Average(3)
2 ns
100 mV
533 swps
CHANGE PARAM
On line
1 2 3 4 5
DELETE ALL PARAMETERS
measure
median
minimum
over+
over-
period
of
1 2 3 4
A B C D
240 sweeps: average low high sigma
over+(C) 5.1 % 5.0 6.0 0.2
rise(C) 0.83 ns 0.81 0.83 0.00
2 ns RIS
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
3 DC 250 mV
10 GS/s
NORMAL

7.6.3.5.4 Channel 4 Overshoot and Rise time Adjustment

- Apply the fast **Rise time** pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 4.

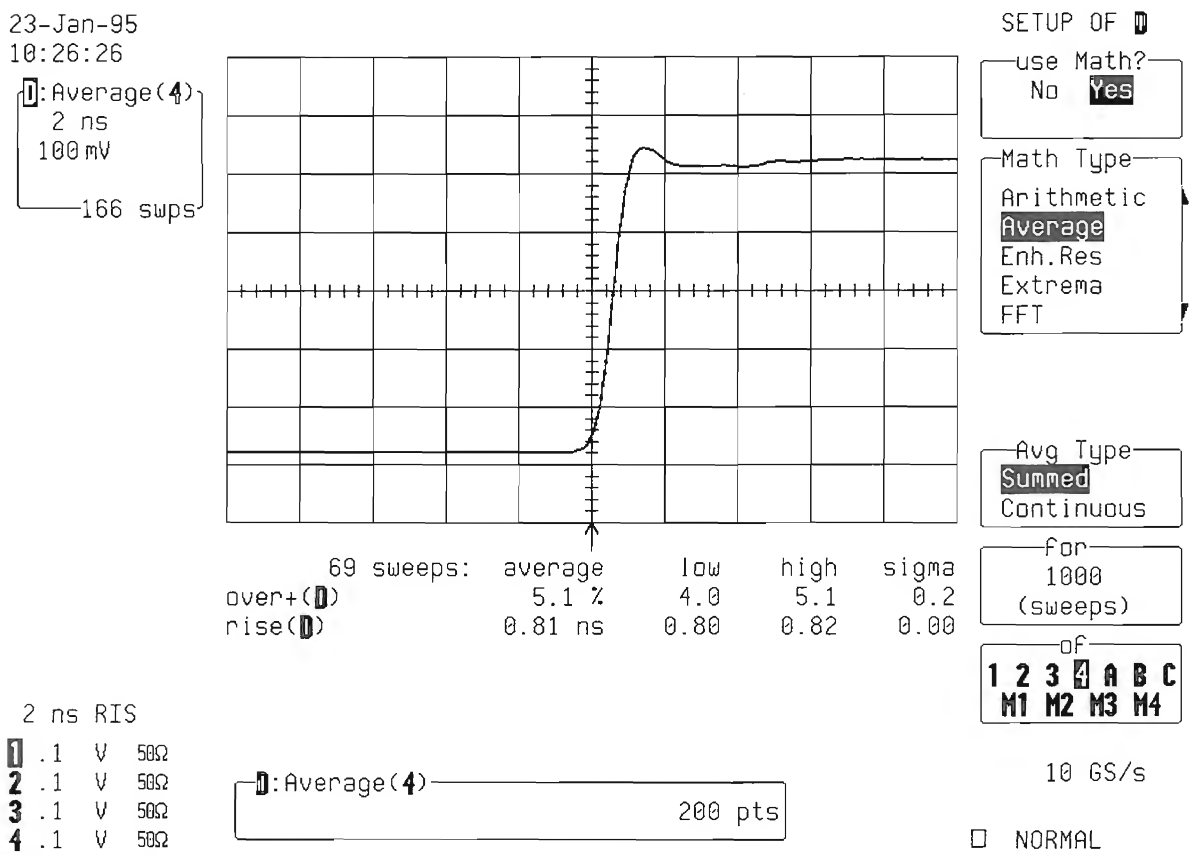
▪ Turn on trace	: Ch4
▪ Display setup	: Standard, Persistence off, Dot join on, Single grid
▪ Coupling Channel 4	: DC 50 Ω
▪ V/div. offset	: Normal
▪ Global BWL	: Off
▪ Probe atten	: X1
▪ Input offset	: - 250 mV
▪ Input gain	: 100 mV/div
▪ Trigger setup	: Edge
▪ Trigger on	: 4
▪ Trigger level	: DC 250 mV
▪ Coupling 4	: DC
▪ Slope 4	: Pos
▪ Mode	: Normal
▪ Holdoff	: Off
▪ Timebase	: 2 nsec/div
▪ Record up to	: 50K samples
▫ Delay	: 50 % Pre-Trigger
▪ Turn on trace	: D

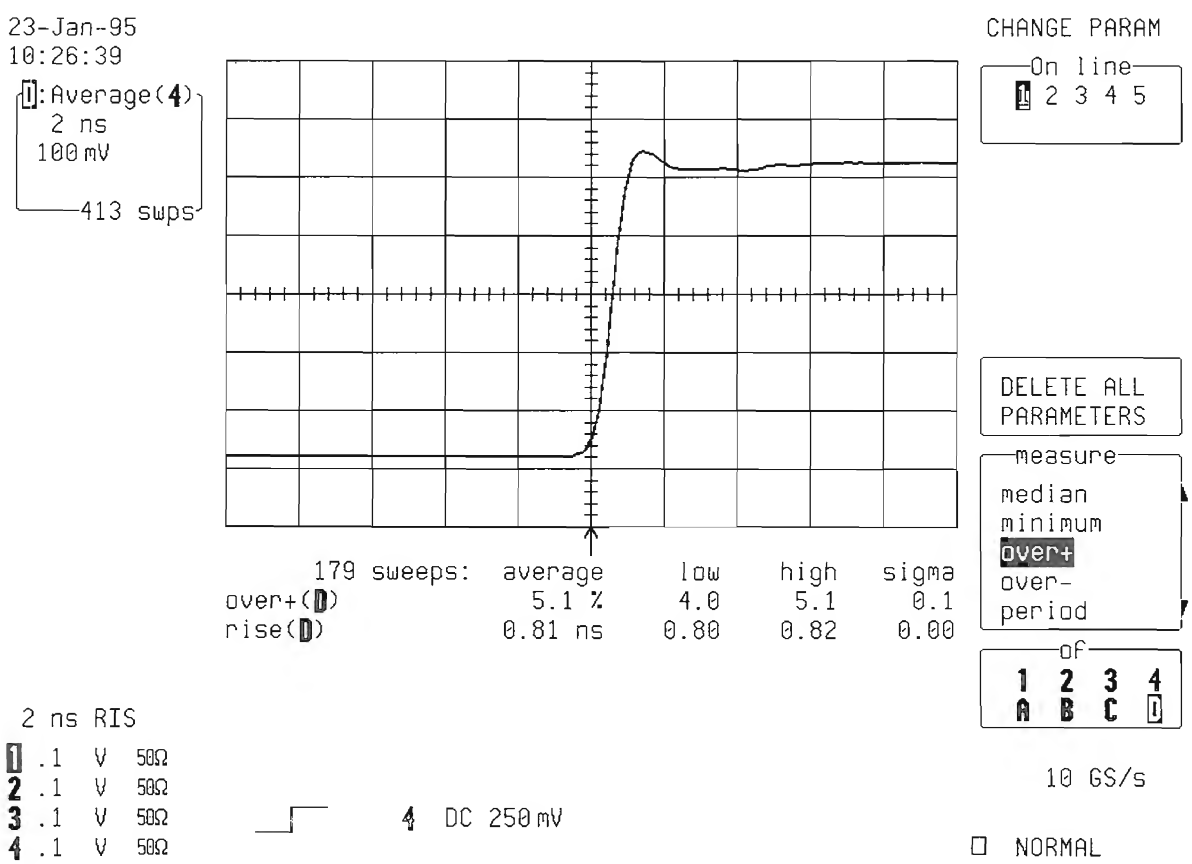
▪ Select Math Setup	
▪ For Math	: Use at most 1000 points
▪ Redefine D	
▪ Use Math ?	: Yes
▪ Math Type	: Average
▪ Avg Type	: Summed
▪ Of	: Channel 4
▫ Turn off trace	: Channel 4

▫ Cursors/Measure	: Parameters
▪ Mode	: Custom
▪ Statistics	: On
▪ Change Parameters	:
▪ On displayed trace	: D
▪ On line 1	:
▪ Measure	: Over + of D
▪ On line 2	:
▪ Measure	: Rise of D

- Adjust C4029 to get : Over + (D) = + 5.5 % , ± 3 %

- Check that Rise time is less than 0.9 nsec


23-Jan-95
10:26:26
D: Average(4)
2 ns
100 mV
166 swps
SETUP OF D
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
69 sweeps: average low high sigma
over+(D) 5.1 % 4.0 5.1 0.2
rise(D) 0.81 ns 0.80 0.82 0.00
of
1 2 3 4 A B C
M1 M2 M3 M4
2 ns RIS
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
D: Average(4)
200 pts
10 GS/s
NORMAL


23-Jan-95
10:26:39
D: Average(4)
2 ns
100 mV
413 swps
CHANGE PARAM
On line
1 2 3 4 5
DELETE ALL
PARAMETERS
measure
median
minimum
over+
over-
period
179 sweeps: average low high sigma
over+(D) 5.1 % 4.0 5.1 0.1
rise(D) 0.81 ns 0.80 0.82 0.00
of
1 2 3 4
A B C D
2 ns RIS
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
4 DC 250 mV
10 GS/s
NORMAL

7.6.3.6 Flatness Adjustment

7.6.3.6.1 Channel 1 HF Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 1. Set pulser to 62.5 msec low frequency.

- Turn on trace : Ch1
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Coupling Channel 1 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div

- Trigger setup : Edge
- Trigger on : 1
- Trigger level : DC 250 mV
- Coupling 1 : DC
- Slope 1 : Pos
- Mode : Normal
- Holdoff : Off

- Timebase : 20 µsec/div
- Record up to : 50K samples
- Delay : 10 % Pre-Trigger

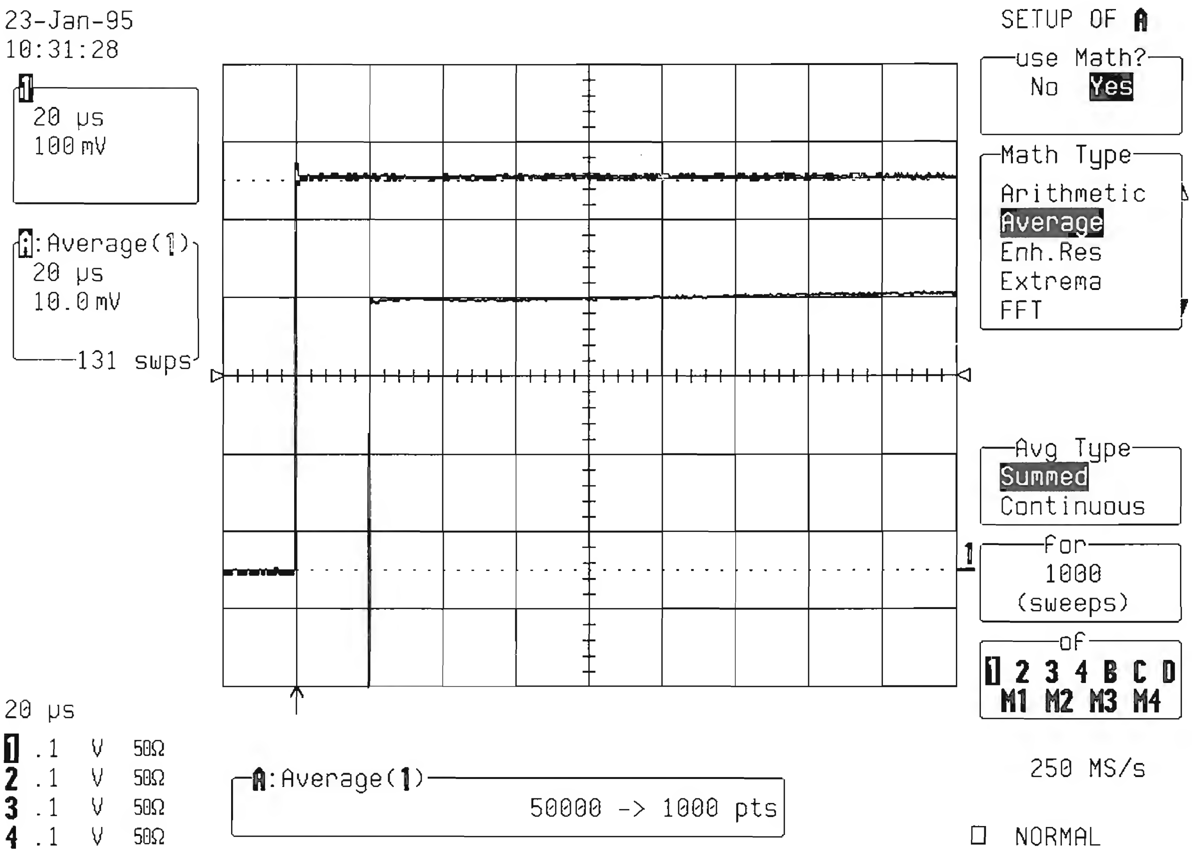
- Turn on trace : A
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine A
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 1

- With the vertical Zoom set A to 10 mV

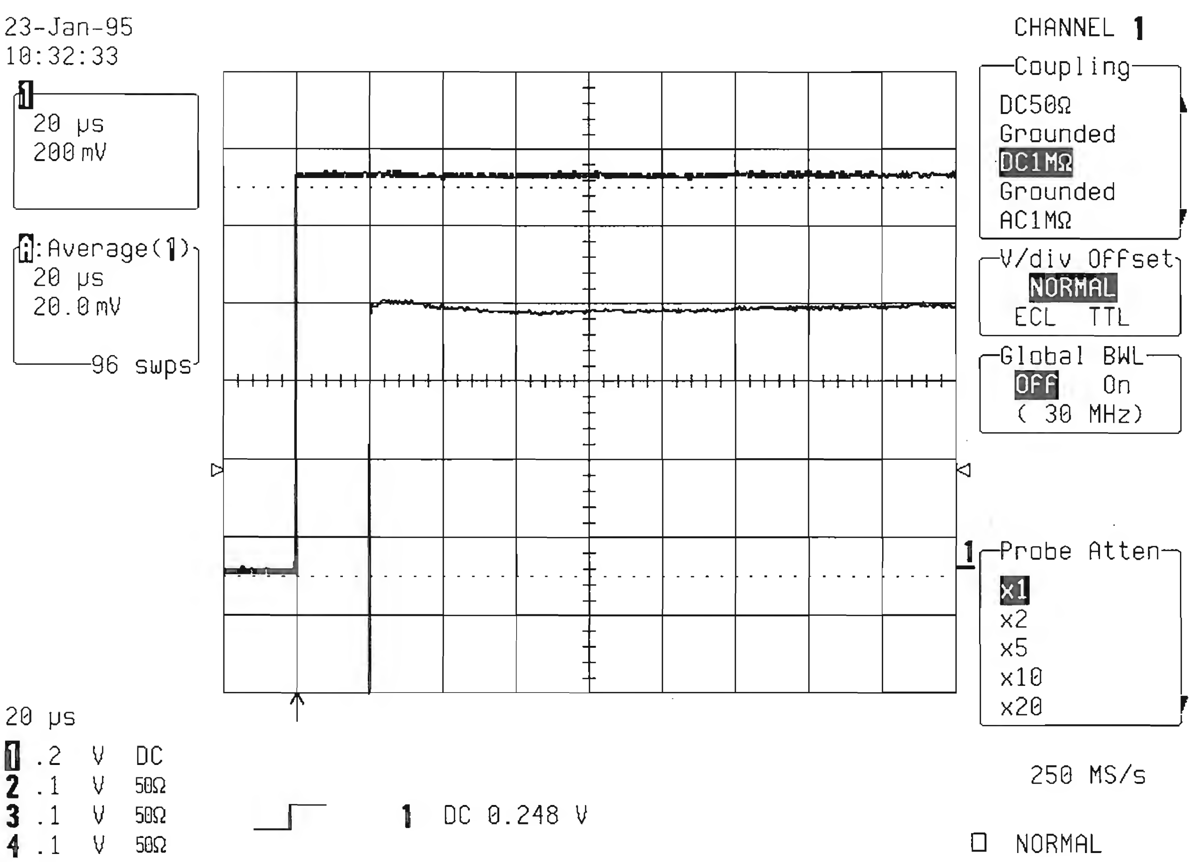
- Adjust pot R1041 to get a flat square wave.

- Set Input gain : 200 mV/div
- Coupling Channel 1 : DC 1 MΩ

- Adjust cap C1009 to get a flat square wave.



23-Jan-95
10:31:28
1
20 µs
100 mV
A:Average(1)
20 µs
10.0 mV
131 swps
20 µs
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
A:Average(1)
50000 -> 1000 pts
SETUP OF A
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 B C D
M1 M2 M3 M4
250 MS/s
NORMAL



23-Jan-95
10:32:33
1
20 µs
200 mV
A:Average(1)
20 µs
20.0 mV
96 swps
20 µs
1 .2 V DC
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
1 DC 0.248 V
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
250 MS/s
NORMAL

7.6.3.6.2 Channel 2 HF Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 2. Set pulser to 62.5 msec low frequency.

- Turn on trace : Ch2
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Coupling Channel 2 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div

- Trigger setup : Edge
- Trigger on : 2
- Trigger level : DC 250 mV
- Coupling 2 : DC
- Slope 2 : Pos
- Mode : Normal
- Holdoff : Off

- Timebase : 20 µsec/div
- Record up to : 50K samples
- Delay : 10 % Pre-Trigger

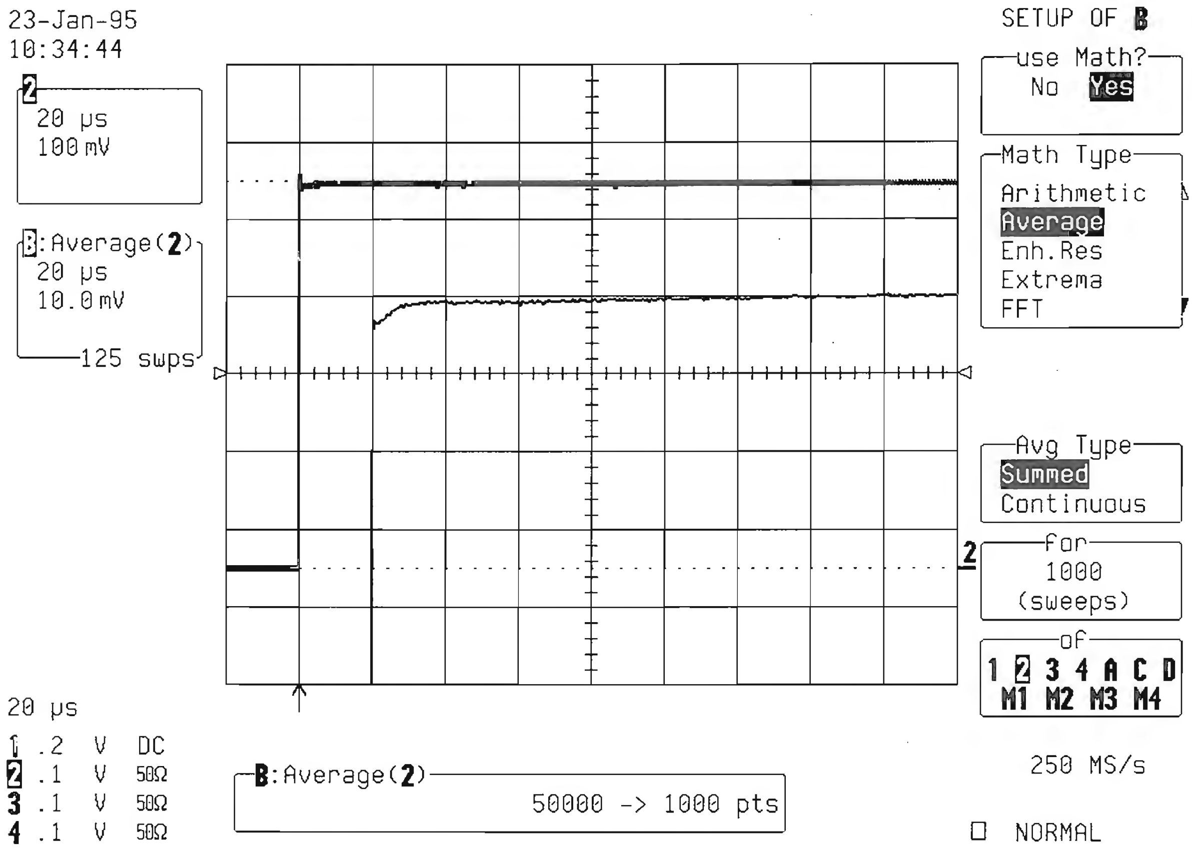
- Turn on trace : B
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine B
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 2

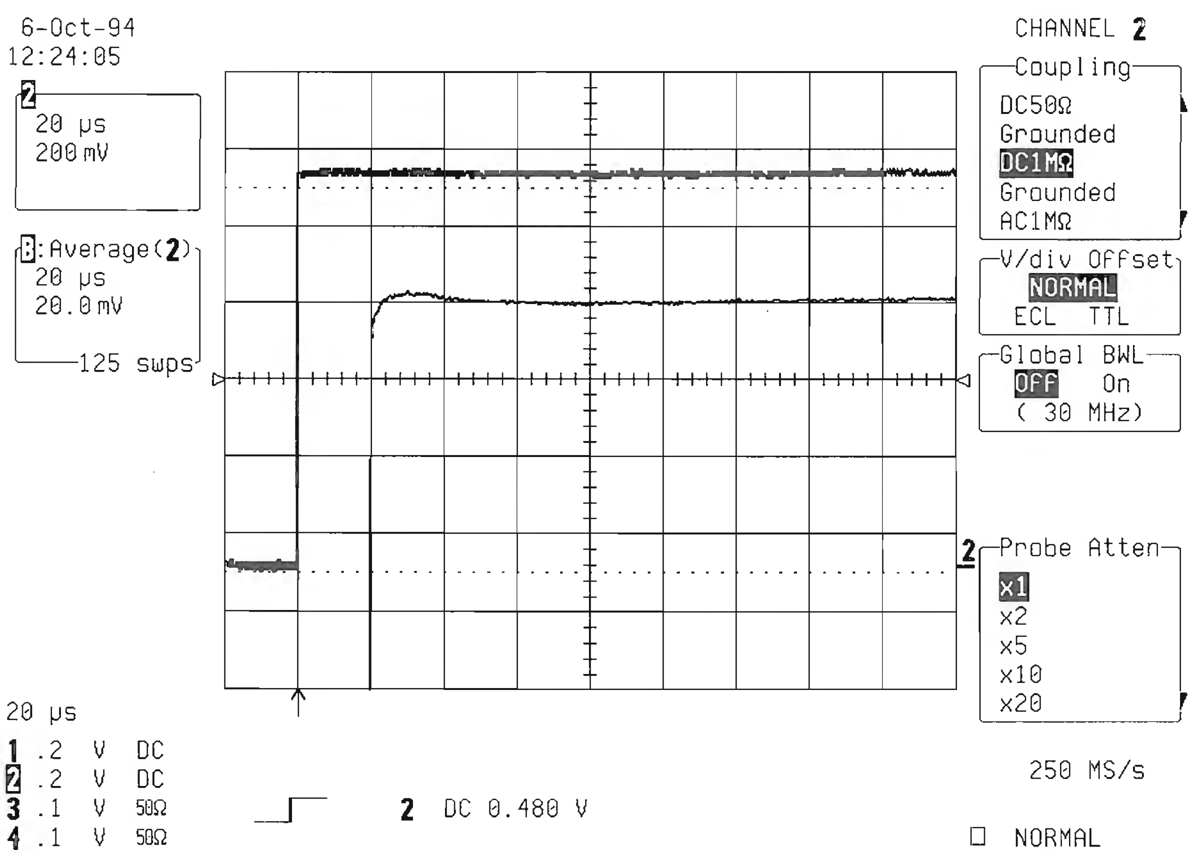
- With the vertical Zoom set B to 10 mV

- Adjust pot R2041 to get a flat square wave.

- Set Input gain : 200 mV/div
- Coupling Channel 2 : DC 1 MΩ

- Adjust cap C2009 to get a flat square wave.


23-Jan-95
10:34:44
2
20 µs
100 mV
B:Average(2)
20 µs
10.0 mV
125 swps
20 µs
1 .2 V DC
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
B:Average(2)
50000 -> 1000 pts
SETUP OF B
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 A C D
M1 M2 M3 M4
250 MS/s
NORMAL


6-Oct-94
12:24:05
2
20 µs
200 mV
B:Average(2)
20 µs
20.0 mV
125 swps
20 µs
1 .2 V DC
2 .2 V DC
3 .1 V 50Ω
4 .1 V 50Ω
2 DC 0.480 V
CHANNEL 2
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
OFF On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
250 MS/s
NORMAL

7.6.3.6.3 Channel 3 HF Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 3. Set pulser to 62.5 msec low frequency.

- Turn on trace : Ch3
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Coupling Channel 3 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div

- Trigger setup : Edge
- Trigger on : 3
- Trigger level : DC 250 mV
- Coupling 3 : DC
- Slope 3 : Pos
- Mode : Normal
- Holdoff : Off

- Timebase : 20 μsec/div
- Record up to : 50K samples
- Delay : 10 % Pre-Trigger

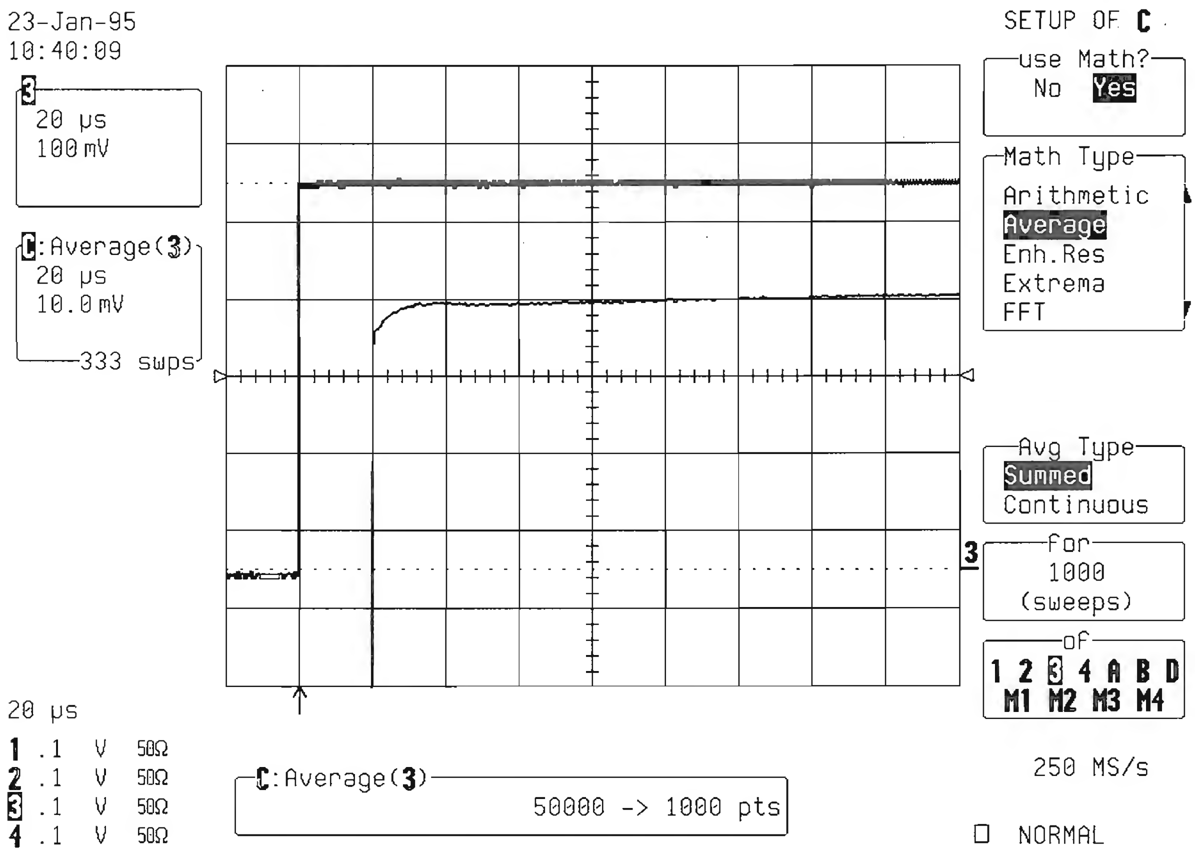
- Turn on trace : C
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine C
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 3

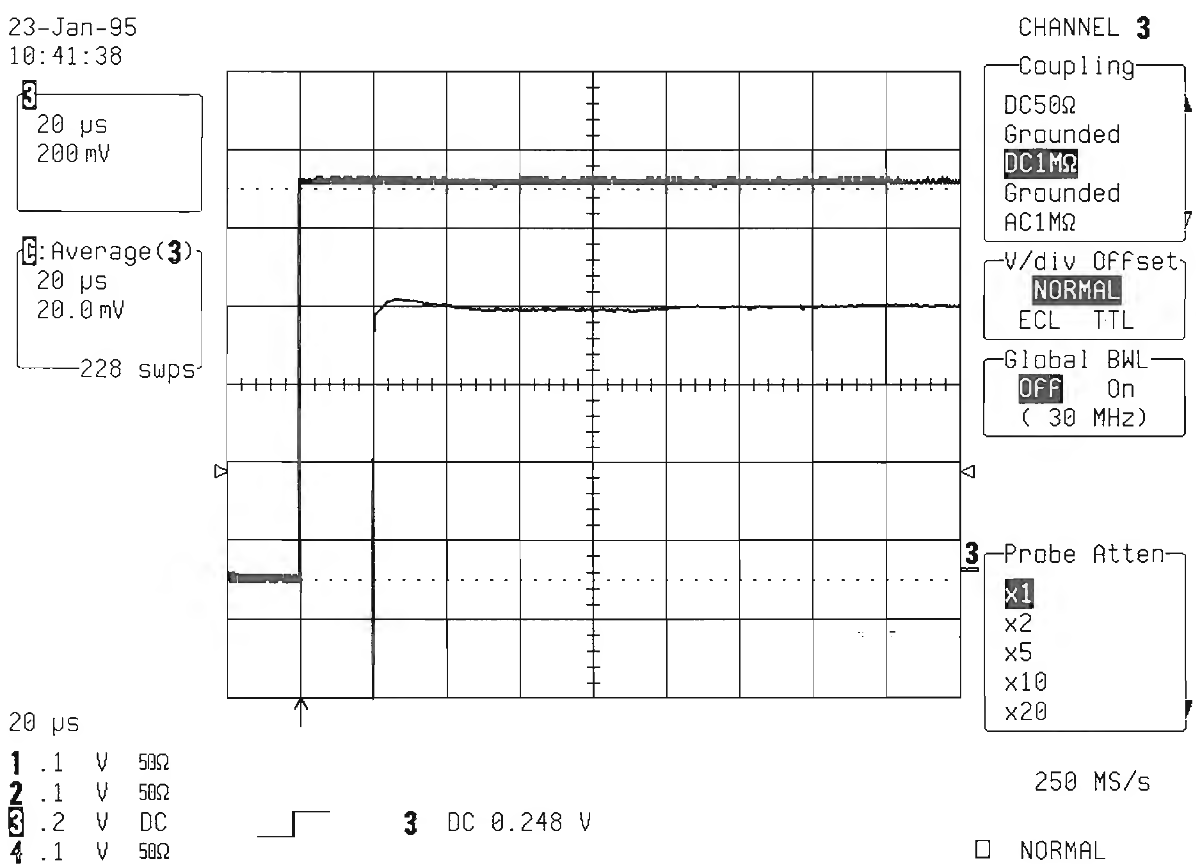
- With the vertical Zoom set C to 10 mV

- Adjust pot R3041 to get a flat square wave.

- Set Input gain : 200 mV/div
- Coupling Channel 3 : DC 1 MΩ

- Adjust cap C3009 to get a flat square wave.


23-Jan-95
10:40:09
3
20 µs
100 mV
C: Average(3)
20 µs
10.0 mV
333 swps
20 µs
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
C: Average(3)
50000 -> 1000 pts
SETUP OF C
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 A B D
M1 M2 M3 M4
250 MS/s
NORMAL


23-Jan-95
10:41:38
3
20 µs
200 mV
C: Average(3)
20 µs
20.0 mV
228 swps
20 µs
1 .1 V 50Ω
2 .1 V 50Ω
3 .2 V DC
4 .1 V 50Ω
3 DC 0.248 V
CHANNEL 3
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
250 MS/s
NORMAL

7.6.3.6.4 Channel 4 HF Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 4. Set pulser to 62.5 msec low frequency.

- Turn on trace : Ch4
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Coupling Channel 4 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div

- Trigger setup : Edge
- Trigger on : 4
- Trigger level : DC 250 mV
- Coupling 4 : DC
- Slope 4 : Pos
- Mode : Normal
- Holdoff : Off

- Timebase : 20 μsec/div
- Record up to : 50K samples
- Delay : 10 % Pre-Trigger

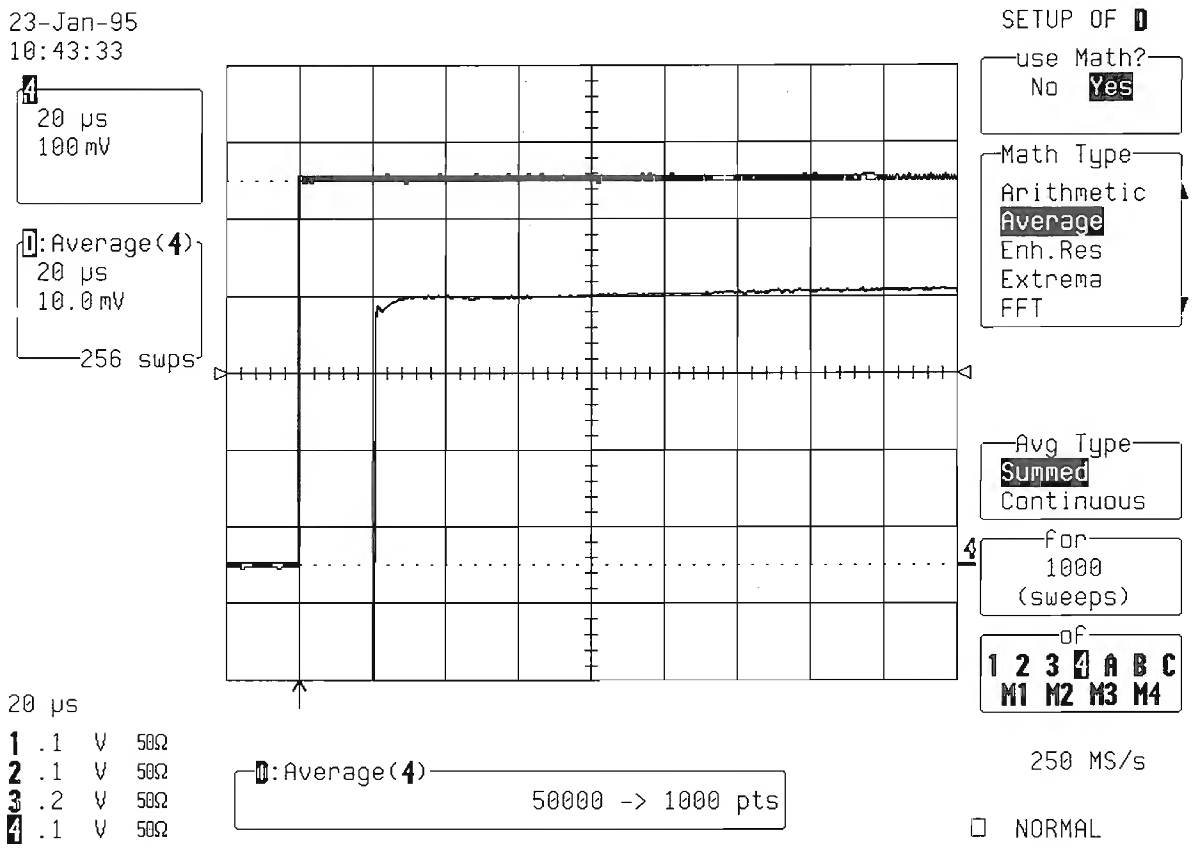
- Turn on trace : D
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine D
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 4

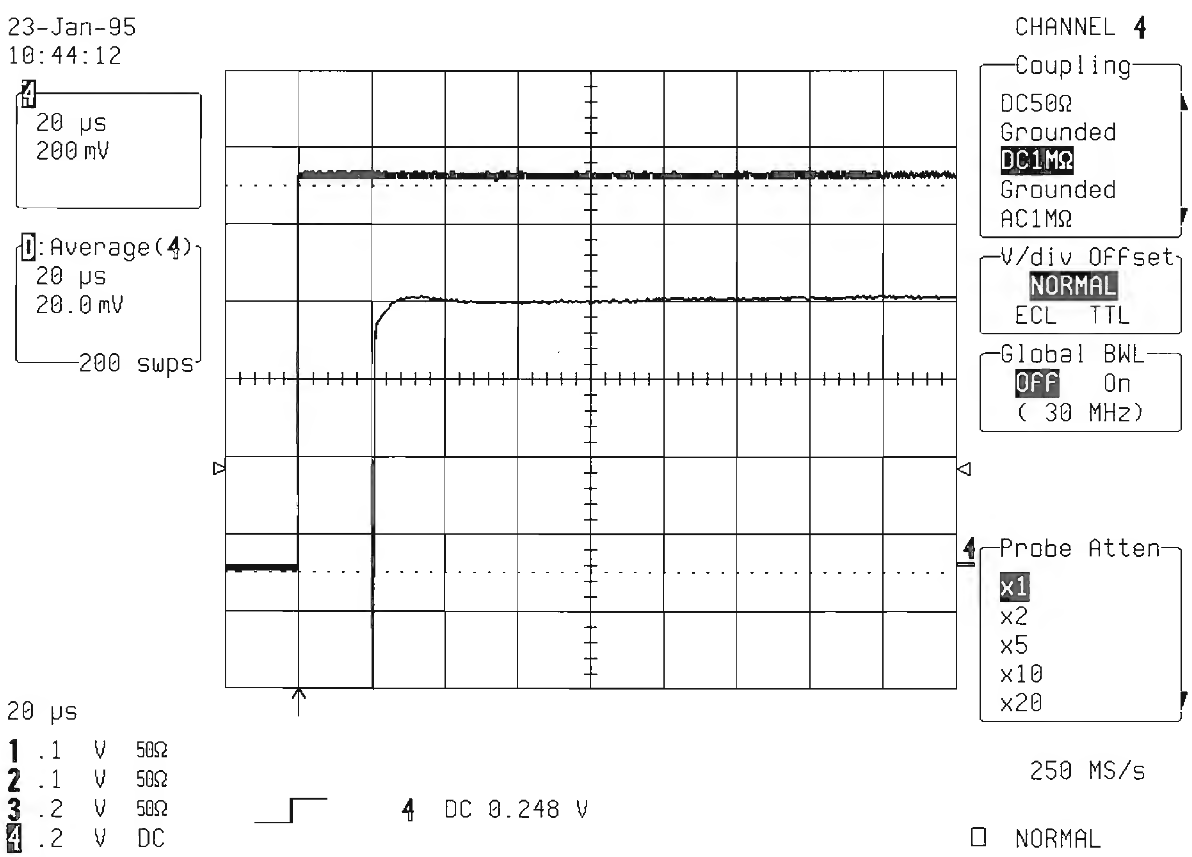
- With the vertical Zoom set D to 10 mV

- Adjust pot R4041 to get a flat square wave.

- Set Input gain : 200 mV/div
- Coupling Channel 4 : DC 1 MΩ

- Adjust cap C4009 to get a flat square wave.


23-Jan-95
10:43:33
4
20 µs
100 mV
D: Average(4)
20 µs
10.0 mV
256 swps
20 µs
1 .1 V 50Ω
2 .1 V 50Ω
3 .2 V 50Ω
4 .1 V 50Ω
D: Average(4)
50000 -> 1000 pts
SETUP OF D
use Math?
No Yes
Math Type
Arithmetic
Average
Enh.Res
Extrema
FFT
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 A B C
M1 M2 M3 M4
250 MS/s
NORMAL


23-Jan-95
10:44:12
4
20 µs
200 mV
D: Average(4)
20 µs
20.0 mV
200 swps
20 µs
1 .1 V 50Ω
2 .1 V 50Ω
3 .2 V 50Ω
4 .2 V DC
4 DC 0.248 V
CHANNEL 4
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
250 MS/s
NORMAL

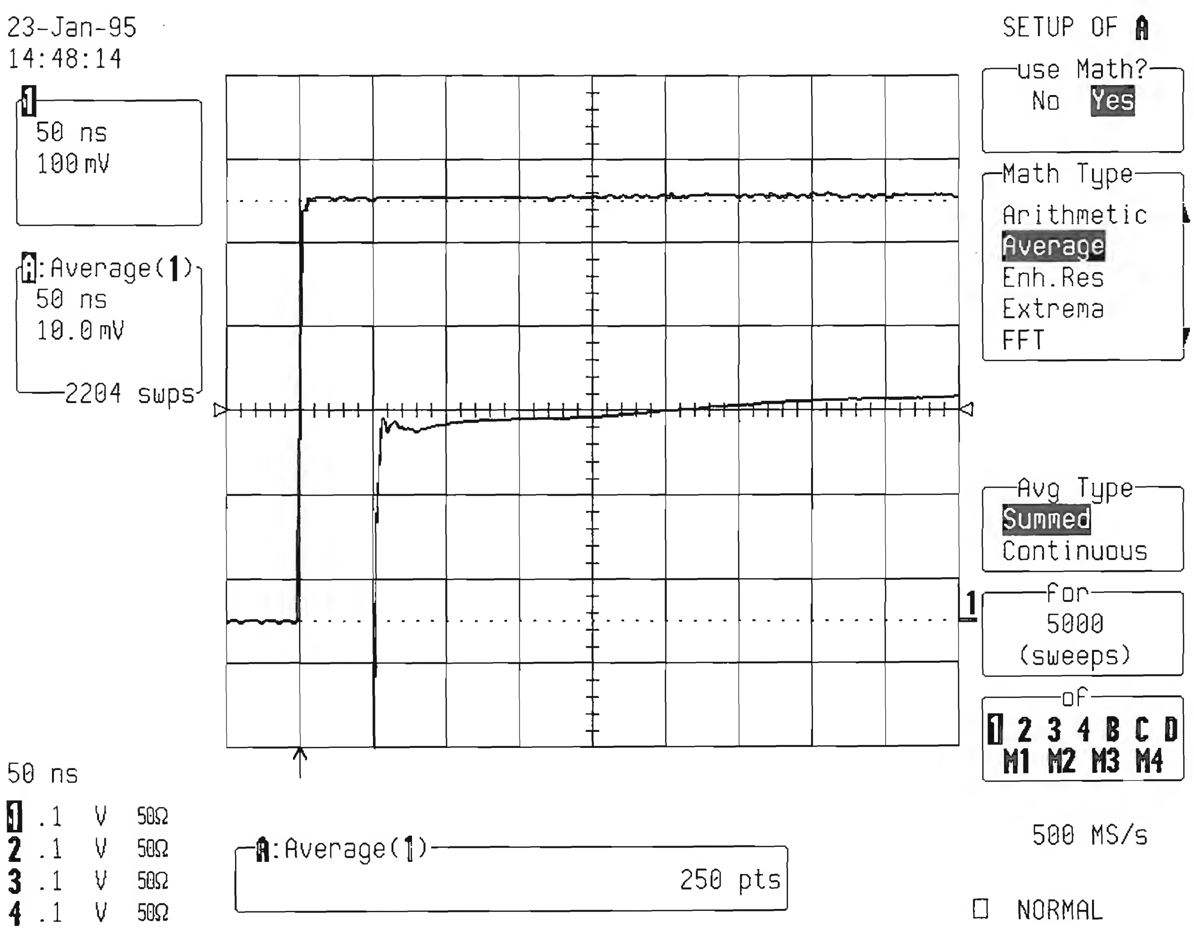
7.6.3.7 Sample & Hold Flatness Adjustment

7.6.3.7.1 Channel 1 Sample&Hold Flatness Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 1. Set pulser to 62.5 µsec high frequency.

- Turn on trace : Ch1
- Coupling Channel 1 : DC 50 Ω
- Input gain : 100 mV/div
- Trigger on : 1
- Trigger level : DC 250 mV
- Coupling 1 : DC
- Slope 1 : Pos
- Timebase : 50 nsec/div
- Delay : 10 % Pre-Trigger
- Turn on trace : A
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine A : Summed Average of Channel 1
- With the vertical Zoom set A to 10 mV

- Adjust pot R1518, C1553, R1577 (at left of A1500 HSH416) to get the best flatness as possible.



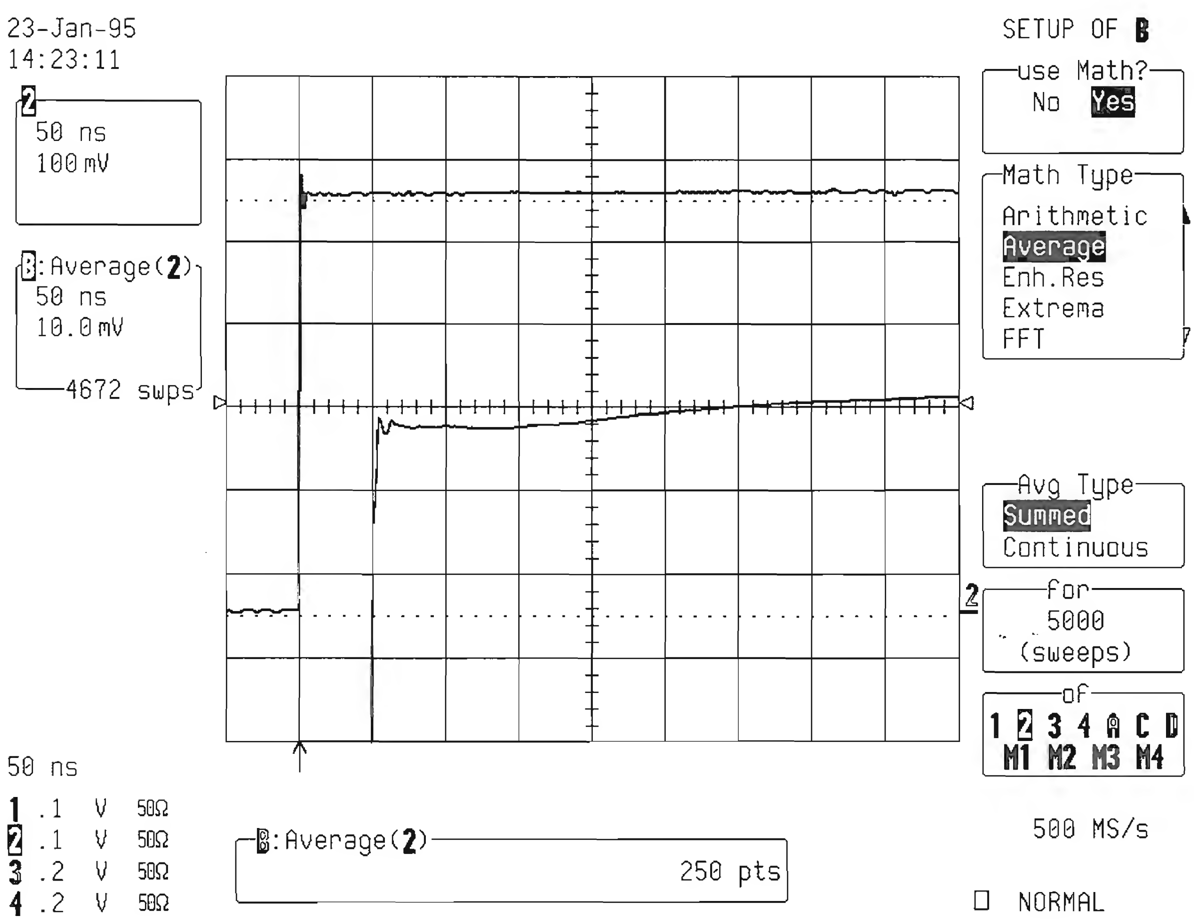
7.6.3.7.2 Channel 2 Sample&Hold Flatness Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 2. Set pulser to 62.5 µsec high frequency.

- Turn on trace : Ch2
- Coupling Channel 2 : DC 50 Ω
- Input gain : 100 mV/div
- Trigger on : 2
- Trigger level : DC 250 mV
- Coupling 2 : DC
- Slope 2 : Pos
- Timebase : 50 nsec/div
- Delay : 10 % Pre-Trigger
- Turn on trace : B
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine B : Summed Average of Channel 2

- With the vertical Zoom set B to 10 mV

- Adjust pot R2518, C2553, R2577 (at left of A2500 HSH416) to get the best flatness as possible.



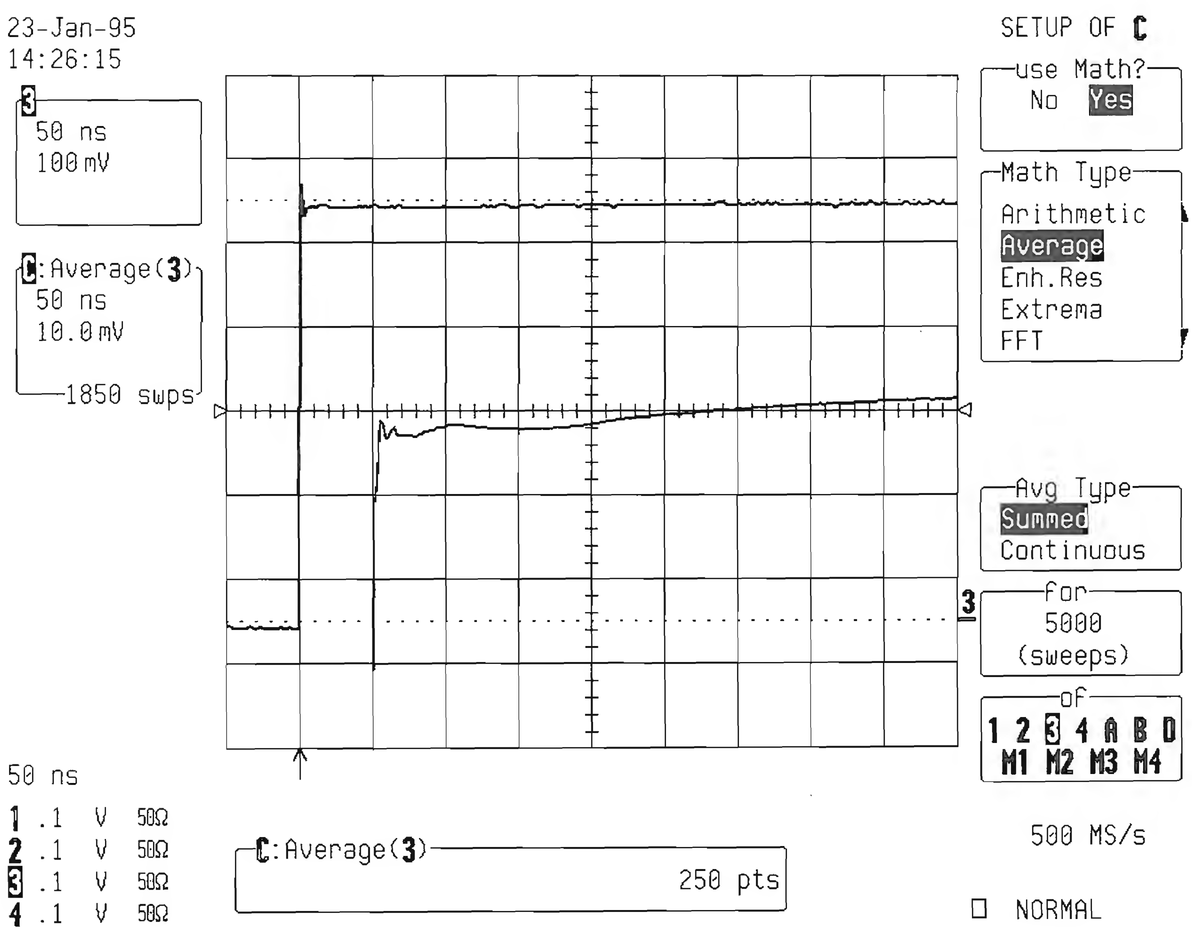
7.6.3.7.3 Channel 3 Sample&Hold Flatness Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 3. Set pulser to 62.5 µsec high frequency.

- Turn on trace : Ch3
- Coupling Channel 3 : DC 50 Ω
- Input gain : 100 mV/div
- Trigger on : 3
- Trigger level : DC 250 mV
- Coupling 3 : DC
- Slope 3 : Pos
- Timebase : 50 nsec/div
- Delay : 10 % Pre-Trigger
- Turn on trace : C
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine C : Summed Average of Channel 3

- With the vertical Zoom set C to 10 mV

- Adjust pot R3518, C3553, R3577 (at left of A3500 HSH416) to get the best flatness as possible.



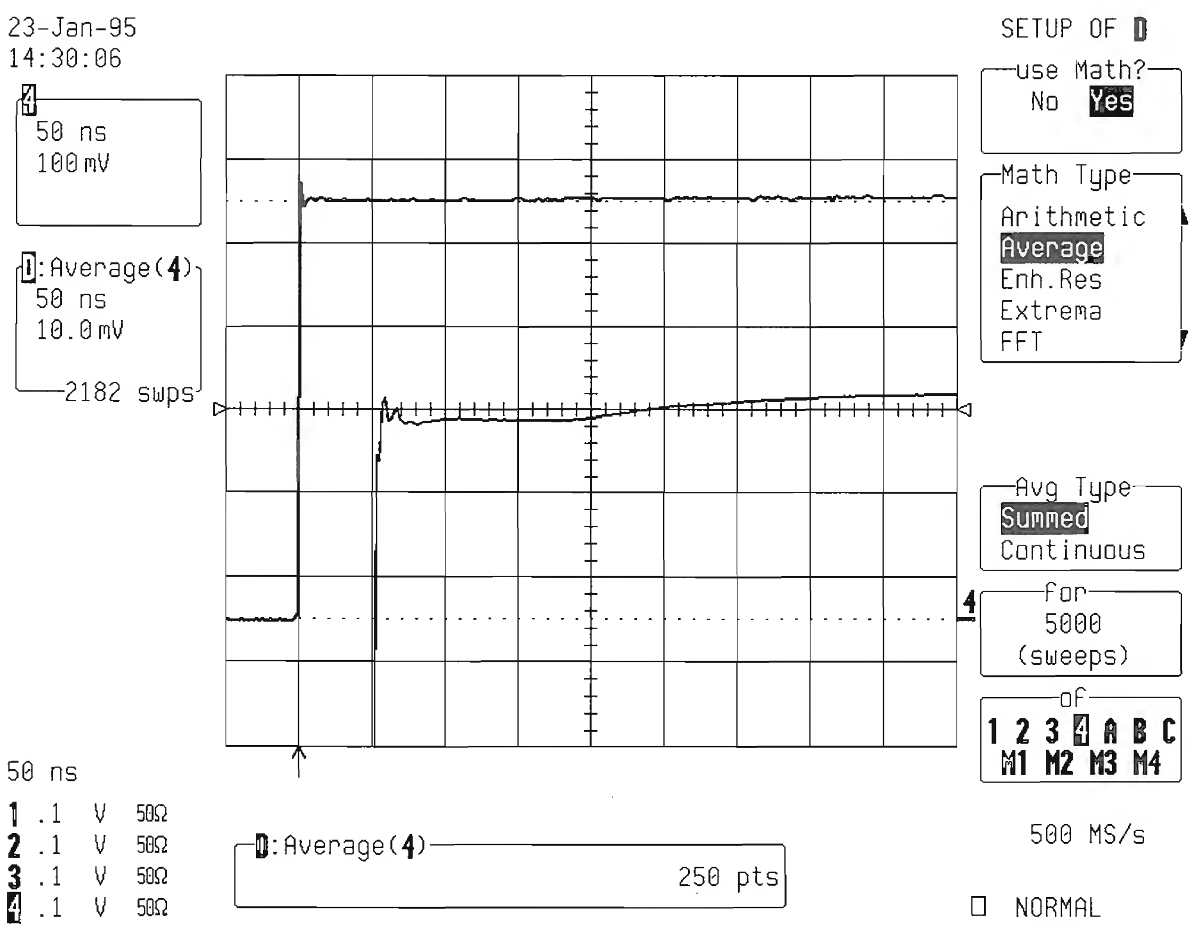
7.6.3.7.4 Channel 4 Sample&Hold Flatness Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 4. Set pulser to 62.5 µsec high frequency.

- Turn on trace : Ch4
- Coupling Channel 4 : DC 50 Ω
- Input gain : 100 mV/div
- Trigger on : 4
- Trigger level : DC 250 mV
- Coupling 4 : DC
- Slope 4 : Pos
- Timebase : 50 nsec/div
- Delay : 10 % Pre-Trigger
- Turn on trace : D
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine D : Summed Average of Channel 4

- With the vertical Zoom set D to 10 mV

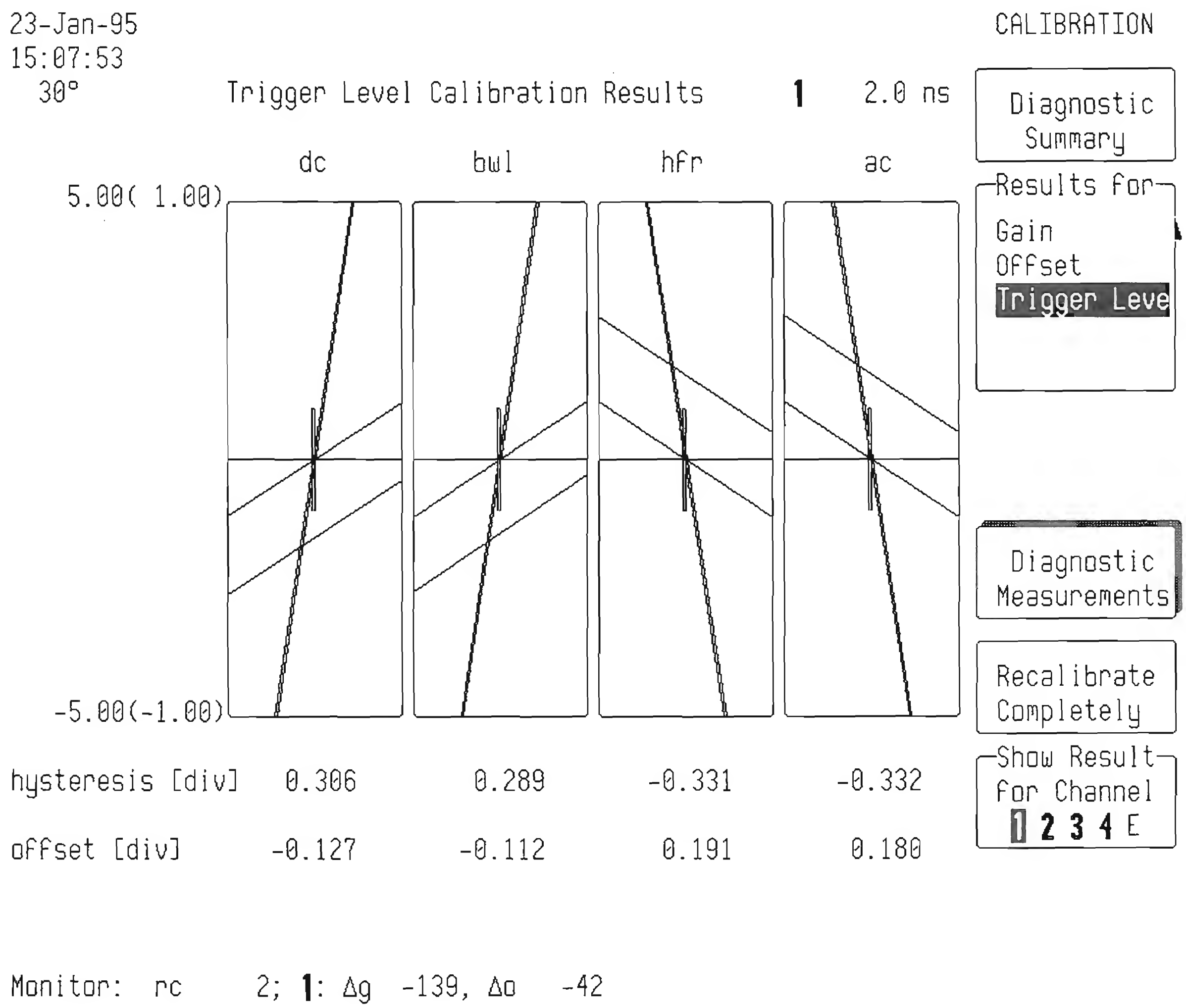
- Adjust pot R4518, C4553, R4577 (at left of A4500 HSH416) to get the best flatness as possible.



7.6.3.8 Trigger Hysteresis Control

7.6.3.8.1 Channel 1 Trigger Hysteresis Adjustment

- In the Calibration Diagnostics select Diagnostics Results.
- Select Results for Trigger level, and Show Result for Channel 1
- Push Recalibrate Completely

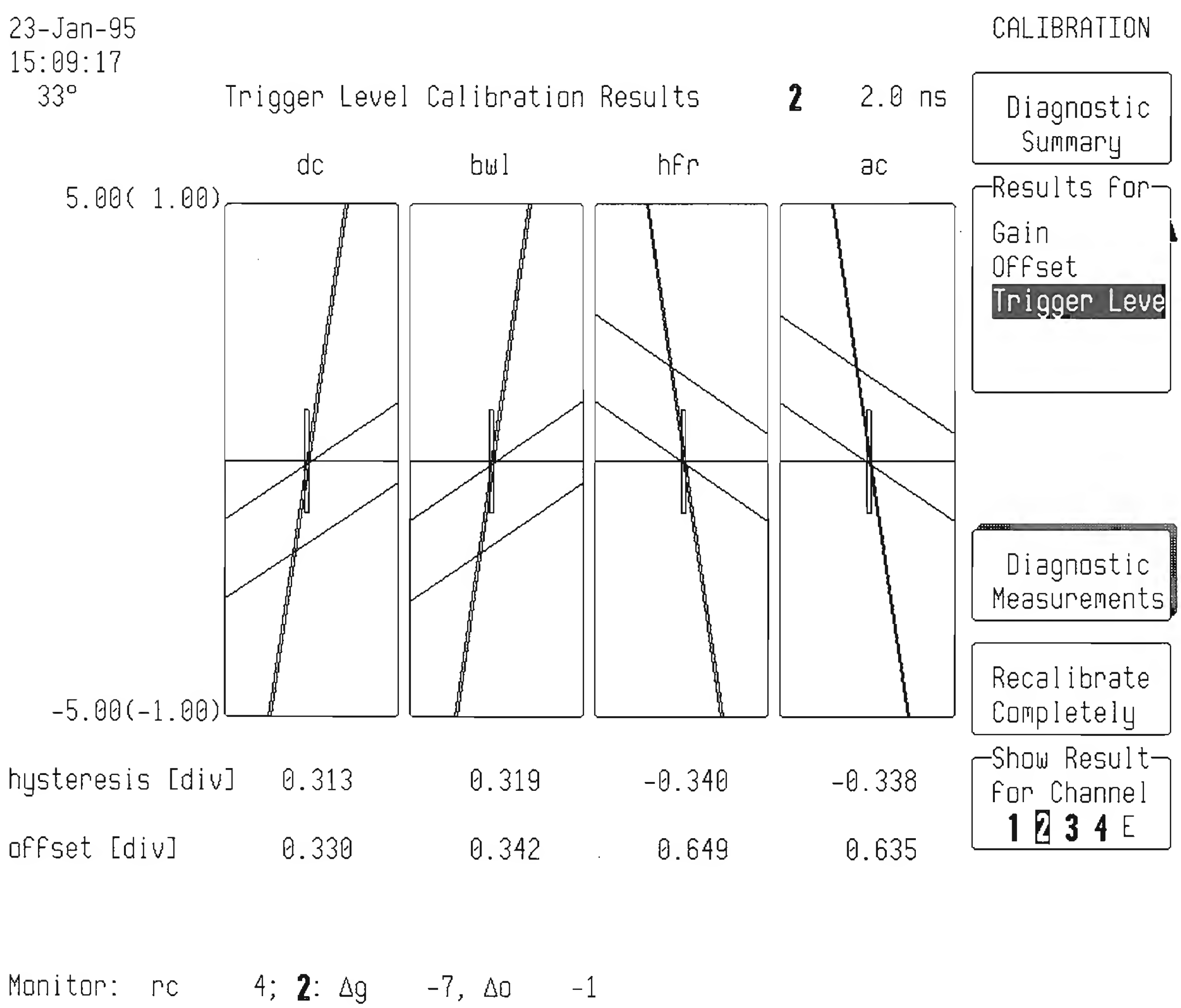


- Adjust potentiometer R5108 to get :

DC Hysteresis (div) = 0.3 div ± 0.05 div

7.6.3.8.2 Channel 2 Trigger Hysteresis Adjustment

- In the Calibration Diagnostics select Diagnostics Results.
- Select Results for Trigger level, and Show Result for Channel 2
- Push Recalibrate Completely

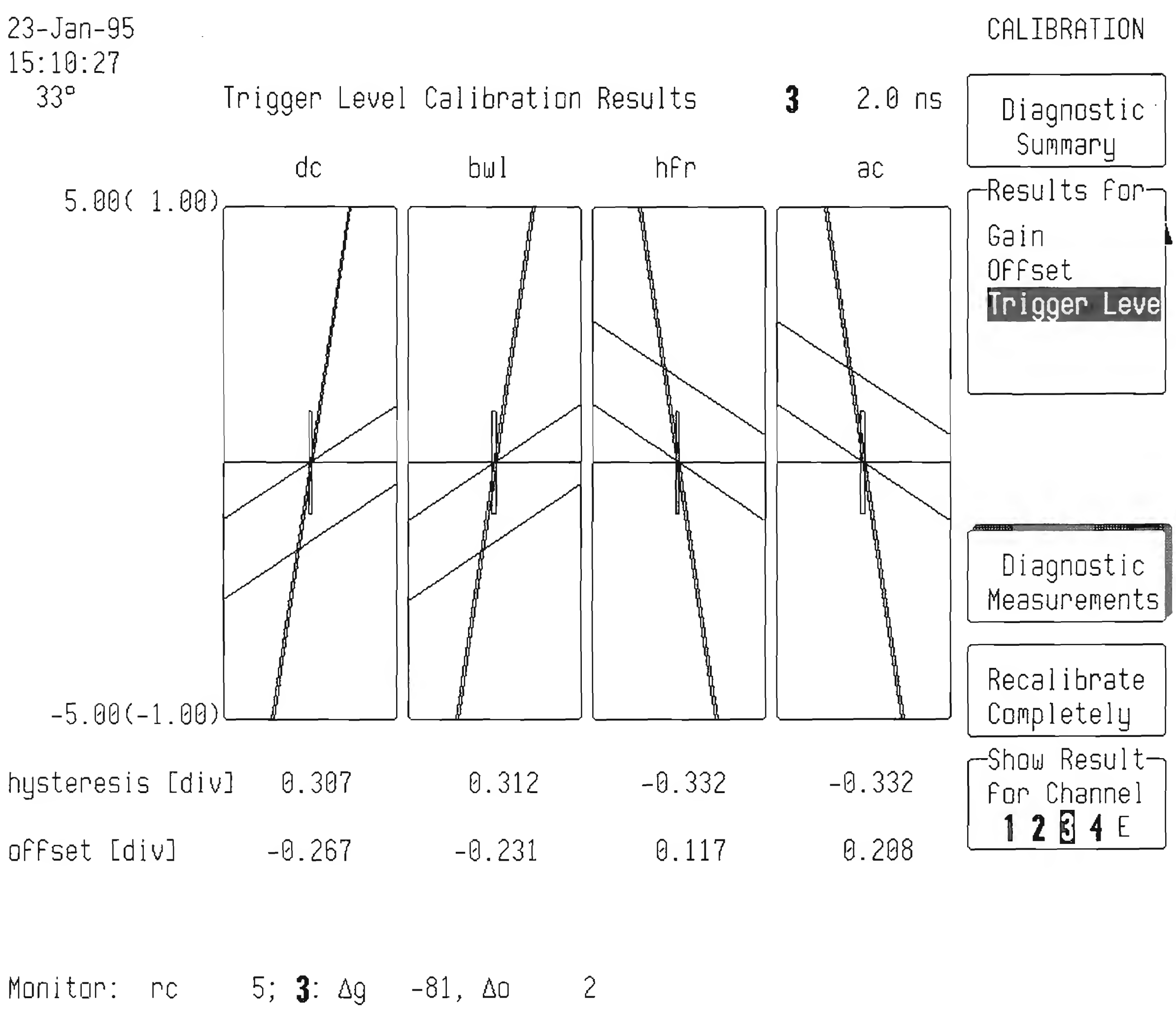


- Adjust potentiometer R5078 to get :

DC Hysteresis (div) = 0.3 div ± 0.05 div

7.6.3.8.3 Channel 3 Trigger Hysteresis Adjustment

- In the Calibration Diagnostics select Diagnostics Results.
- Select Results for Trigger level, and Show Result for Channel 3
- Push Recalibrate Completely

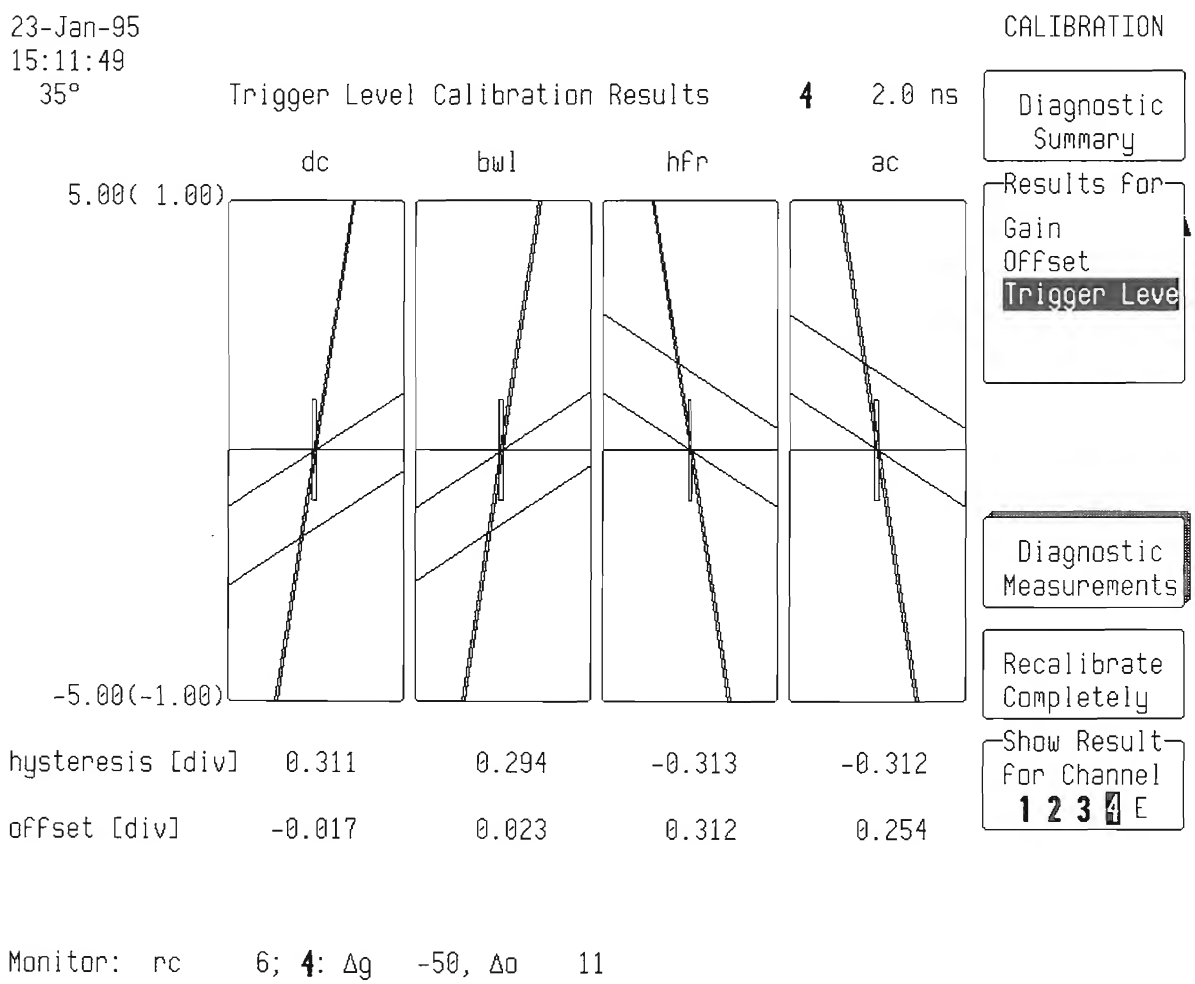


- Adjust potentiometer R5053 to get :

DC Hysteresis (div) = 0.3 div ± 0.05 div

7.6.3.8.4 Channel 4 Trigger Hysteresis Adjustment

- In the Calibration Diagnostics select Diagnostics Results.
- Select Results for Trigger level, and Show Result for Channel 4
- Push Recalibrate Completely

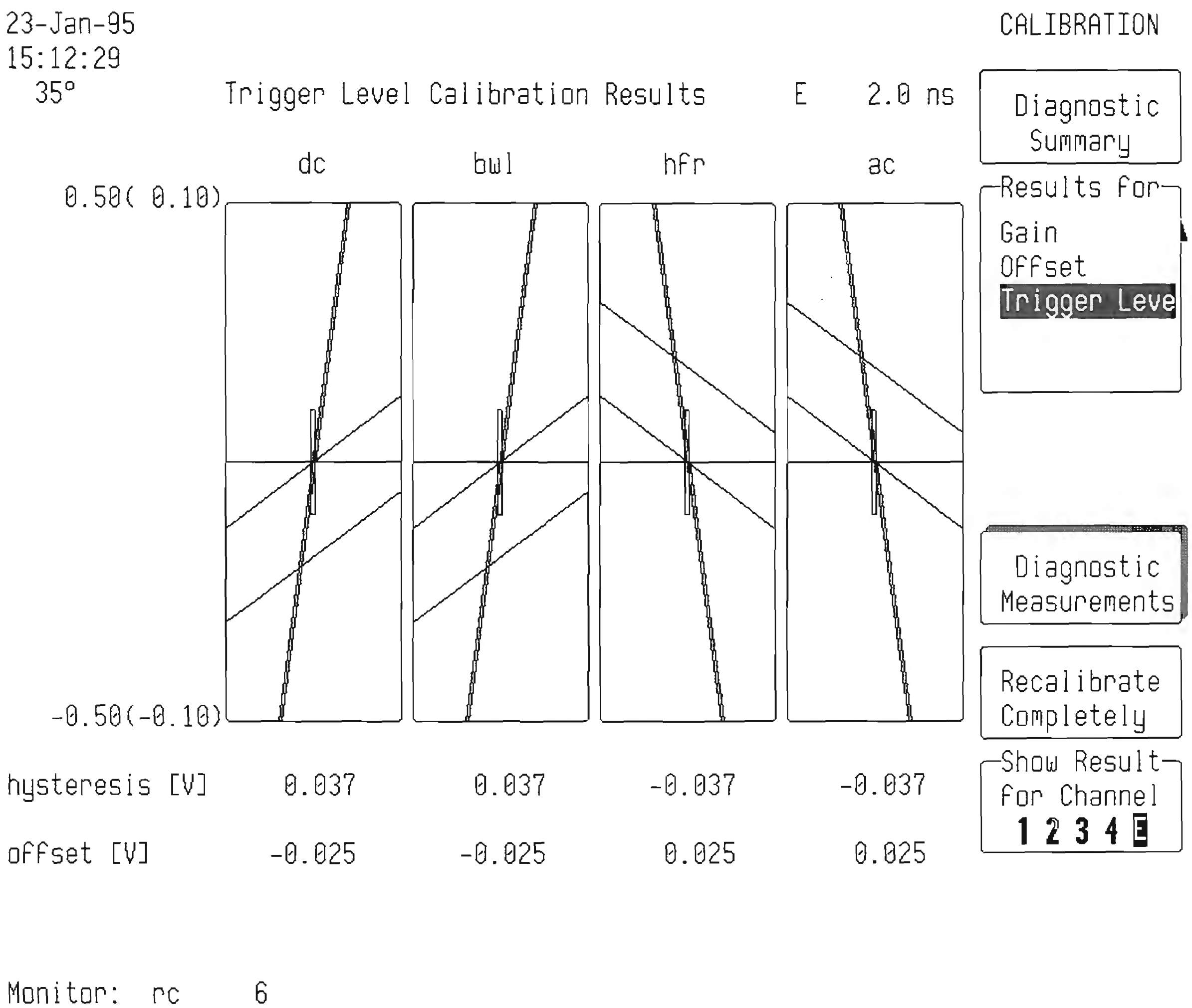


- Adjust potentiometer R5080 to get :

DC Hysteresis (div) = 0.3 div ± 0.05 div

7.6.3.8.5 External Trigger Hysteresis

- In the Calibration Diagnostics, select Diagnostics Results.
- Select Results for Trigger level, and Show Result for E.
- Push Recalibrate Completely



- Check that the DC External Trigger Hysteresis is 0.035 V ± 0.01

CAUTION

- **Do not adjust potentiometer R5055. The External Trigger Hysteresis value cannot be modified without using a special tester.**

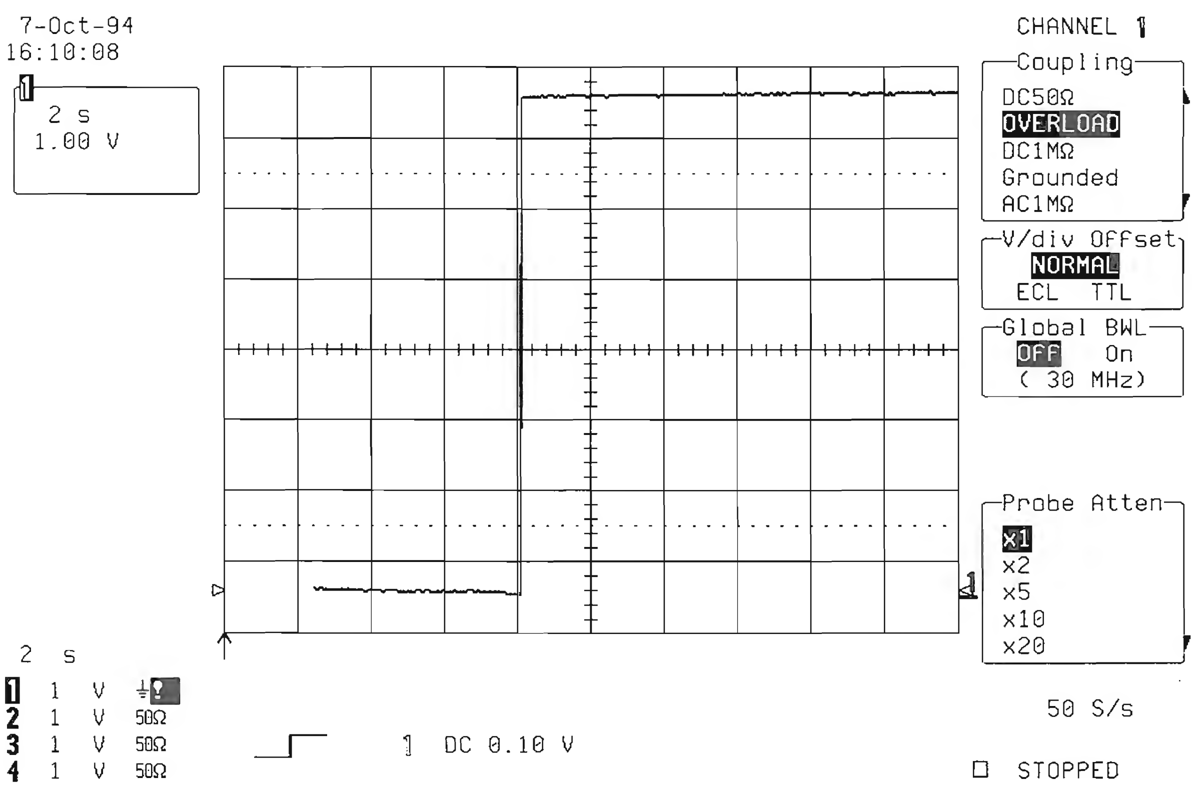
7.6.3.9 DC 50 Ω Overload Adjustment

7.6.3.9.1 Channel 1 DC 50 Ω Overload Adjustment

- Turn on trace : Channel 1
- Input Coupling : DC 50 Ω
- Probe atten : X1
- Input gain : 1 V/div.
- Input offset : - 3.5 V
- Trigger setup : Edge
- Trigger on : 1
- Trigger level : DC 0.1 V
- Delay : zero
- Coupling 1 : DC
- Slope 1 : Pos
- Mode : Auto
- Timebase : 2 sec/div.
- Record up to : 1000 samples

- From the power supply (Tektronix PS5004) apply DC 7.07 V (1 Watt) to Channel 1.

- Adjust the potentiometer R1010, such that the overload trips within 10 to 15 seconds. (turn clockwise if it's too slow or counterclockwise if it's too fast)



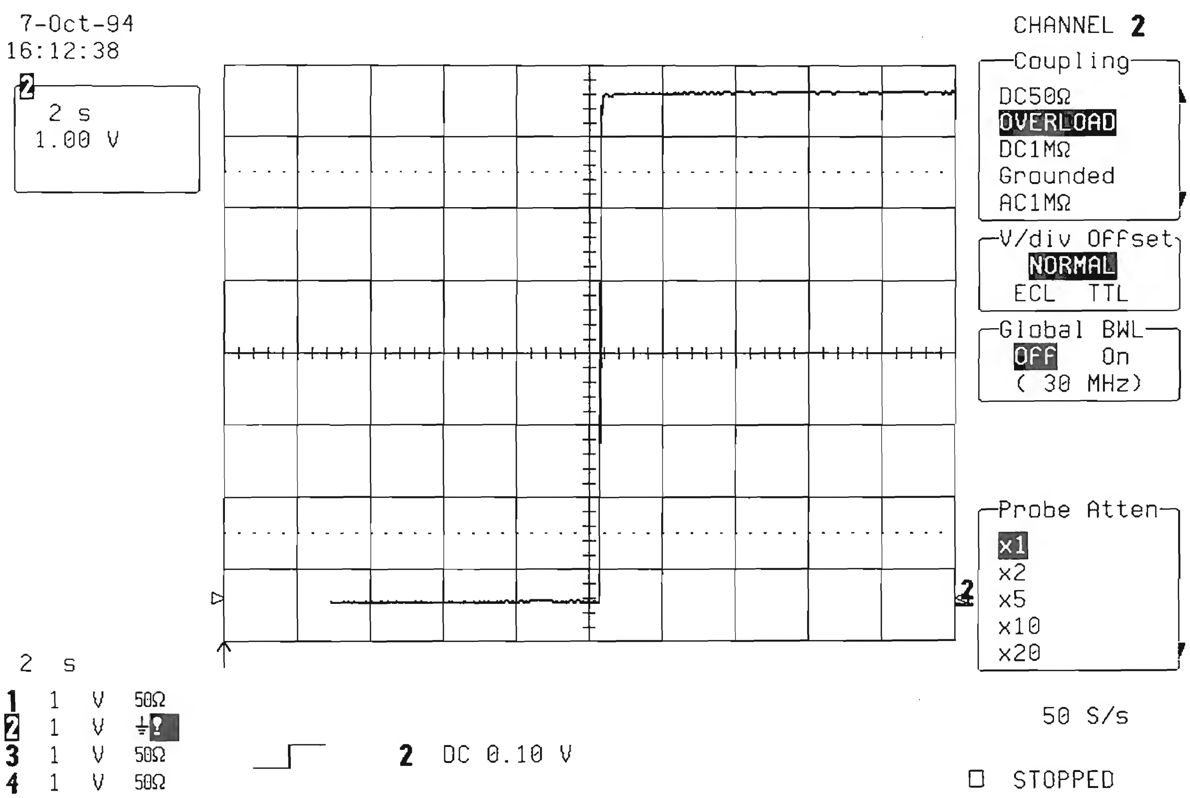
- Set Timebase : **5 sec/div.**
- From the power supply (Tektronix PS5004) apply **5 V** (.5 Watt) to Channel 1
- Check that the overload doesn't trip for at least **30** seconds.

7.6.3.9.2 Channel 2 DC 50 Ω Overload Adjustment

- Turn on trace : Channel 2
- Input Coupling : DC 50 Ω
- Probe atten : X1
- Input gain : 1 V/div.
- Input offset : - 3.5 V
- Trigger setup : Edge
- Trigger on : 2
- Trigger level : DC 0.1 V
- Delay : zero
- Coupling 2 : DC
- Slope 2 : Pos
- Mode : Auto
- Timebase : 2 sec/div.
- Record up to : 1000 samples

- From the power supply (Tektronix PS5004) apply DC 7.07 V (1 Watt) to Channel 2.

- Adjust the potentiometer R2010, such that the overload trips within 10 to 15 seconds. (turn clockwise if it's too slow or counterclockwise if it's too fast)



- Set Timebase : **5 sec/div.**

- From the power supply (Tektronix PS5004) apply **5 V** (.5 Watt) to Channel 2

- Check that the overload doesn't trip for at least **30** seconds.

7.6.3.9.3 Channel 3 DC 50 Ω Overload Adjustment

- Turn on trace : Channel 3
- Input Coupling : DC 50 Ω
- Probe atten : X1
- Input gain : 1 V/div.
- Input offset : - 3.5 V
- Trigger setup : Edge
- Trigger on : 3
- Trigger level : DC 0.1 V
- Delay : zero
- Coupling 3 : DC
- Slope 3 : Pos
- Mode : Auto
- Timebase : 2 sec/div.
- Record up to : 1000 samples
- From the power supply (Tektronix PS5004) apply DC 7.07 V (1 Watt) to Channel 3.

- Adjust the potentiometer R3010, such that the overload trips within 10 to 15 seconds. (turn clockwise if it's too slow or counterclockwise if it's too fast)

- Set Timebase : **5 sec/div.**
- From the power supply (Tektronix PS5004) apply **5 V** (.5 Watt) to Channel 3

- Check that the overload doesn't trip for at least **30** seconds.

7.6.3.9.4 Channel 4 DC 50 Ω Overload Adjustment

- Turn on trace : Channel 4
- Input Coupling : DC 50 Ω
- Probe atten : X1
- Input gain : 1 V/div.
- Input offset : - 3.5 V
- Trigger setup : Edge
- Trigger on : 4
- Trigger level : DC 0.1 V
- Delay : zero
- Coupling 4 : DC
- Slope 4 : Pos
- Mode : Auto
- Timebase : 2 sec/div.
- Record up to : 1000 samples
- From the power supply (Tektronix PS5004) apply DC 7.07 V (1 Watt) to Channel 4.

- Adjust the potentiometer R4010, such that the overload trips within 10 to 15 seconds. (turn clockwise if it's too slow or counterclockwise if it's too fast)

- Set Timebase : **5 sec/div.**
- From the power supply (Tektronix PS5004) apply **5 V** (.5 Watt) to Channel 4

- Check that the overload doesn't trip for at least **30** seconds.

SECTION 8 SCHEMATICS, LAYOUTS, PARTS LIST

9354A, 9354AM, 9354AL, 9354T & 9354TM

Digital Storage Oscilloscope

PART : 9354A DESC : 500 MHz, QUAD CHANNEL 500 MS/s DSO, 50 KB

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	1
554500001	TAPPING SCREW W/U-THREAD	2
709354A16	FRONT LABEL 9354A	1
709354913	SERIAL NUMBER PLATE 9354A	1
F9302-1-4	PROCESSOR CARD WITH 4Mb DRAM	1
F9350-21	ACQUISITION MEMORY 2 X 50 K	2
F9354-31	MAIN CARD (FRONT END, ADC, TDC)	1
F9300-4	GPIB + RS232 INTERFACE CARD	1
F9354-5	QUAD CHANNEL FRONT PANEL	1
M935X	MECHANICAL FOR 9354A	1
ACCESSORIES-9354	ACCESSORIES FOR 9354A	1

PART : 9354AM DESC : 500 MHz, QUAD CHANNEL 500 MS/s DSO, 250 KB

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	1
554500001	TAPPING SCREW W/U-THREAD	2
709354AM16	FRONT LABEL 9354AM	1
709354913	SERIAL NUMBER PLATE 9354AM	1
F9302-1-8	PROCESSOR CARD WITH 8Mb DRAM	1
F9350M-21	ACQUISITION MEMORY 2 X 250 K	2
F9354-31	MAIN CARD (FRONT END, ADC, TDC)	1
F9300-4	GPIB + RS232 INTERFACE CARD	1
F9354-5	QUAD CHANNEL FRONT PANEL	1
M935X	MECHANICAL FOR 9354AM	1
ACCESSORIES-9354	ACCESSORIES FOR 9354AM	1

PART : 9354AL DESC : 500 MHz, QUAD CHANNEL 500 MS/s DSO, 2 MB

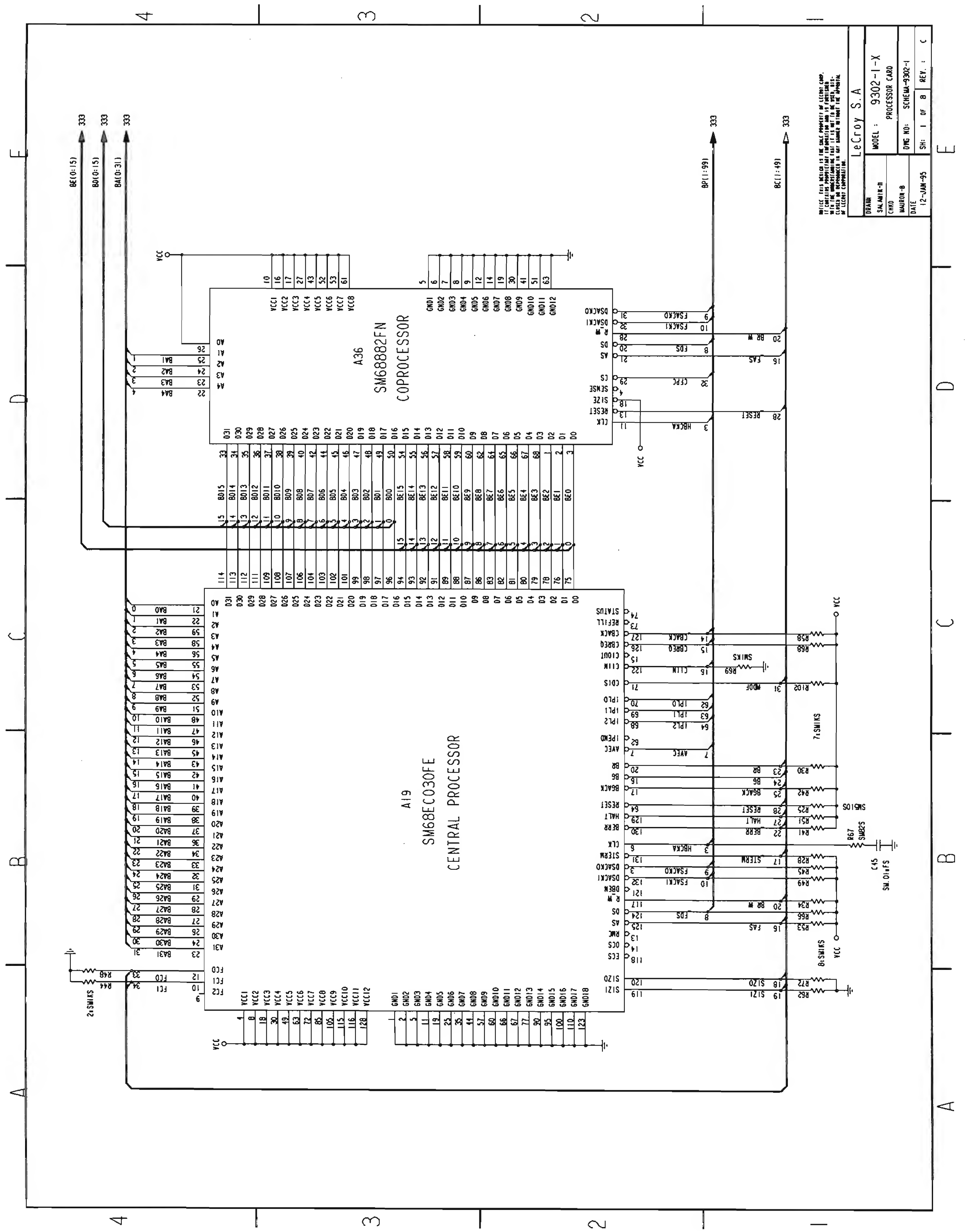
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	1
554500001	TAPPING SCREW W/U-THREAD	2
709354AL16	FRONT LABEL 9354AL	1
709354913	SERIAL NUMBER PLATE 9354AL	1
F9302-1-16	PROCESSOR CARD WITH 16Mb DRAM	1
F9350L-2	ACQUISITION MEMORY 2 X 2 MB	2
F9354-31	MAIN CARD (FRONT END, ADC, TDC)	1
F9300-4	GPIB + RS232 INTERFACE CARD	1
F9354-5	QUAD CHANNEL FRONT PANEL	1
M935X	MECHANICAL FOR 9354AL	1
ACCESSORIES-9354	ACCESSORIES FOR 9354AL	1

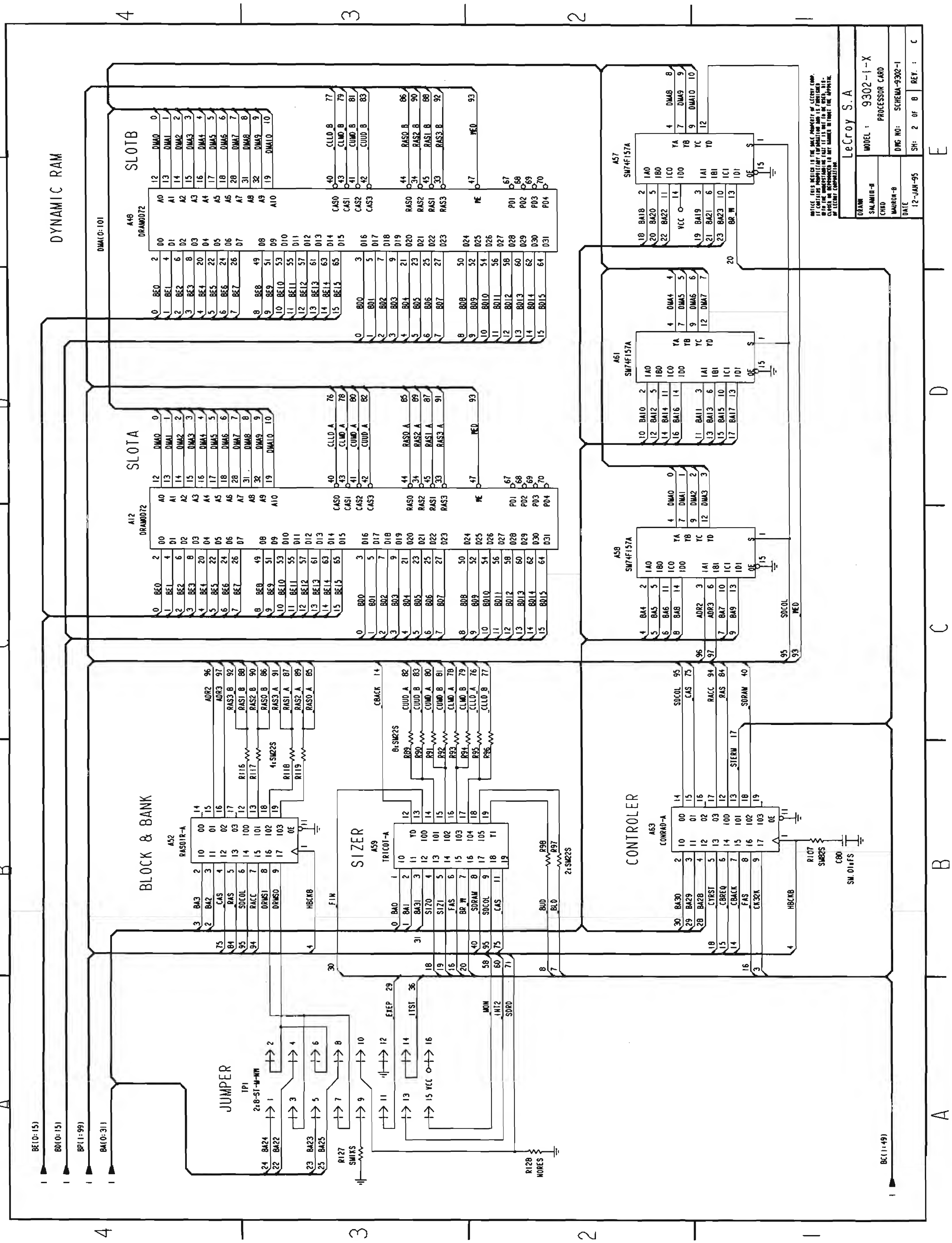
PART : 9354T DESC : 500 MHz, QUAD CHANNEL 500 MS/s DSO, 100 KB

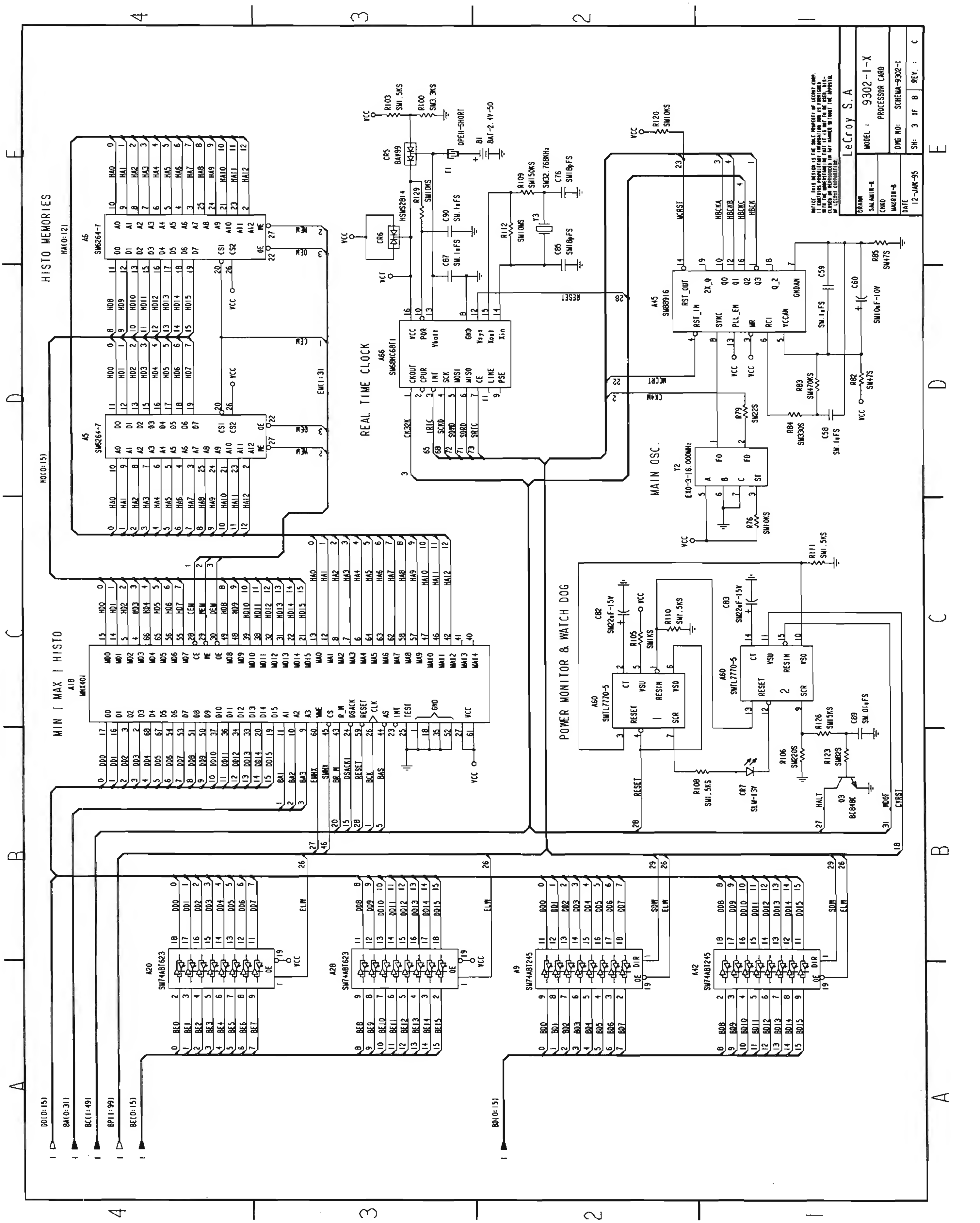
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	1
554500001	TAPPING SCREW W/U-THREAD	2
709354T16	FRONT LABEL 9354T	1
709354913	SERIAL NUMBER PLATE 9354T	1
F9302-1-4	PROCESSOR CARD WITH 4Mb DRAM	1
F9350T-21	ACQUISITION MEMORY 2 X 100 KB	2
F9354-31	MAIN CARD (FRONT END, ADC, TDC)	1
F9300-4	GPIB + RS232 INTERFACE CARD	1
F9354-5	QUAD CHANNEL FRONT PANEL	1
M935X	MECHANICAL FOR 9354T	1
ACCESSORIES-9354	ACCESSORIES FOR 9354T	1

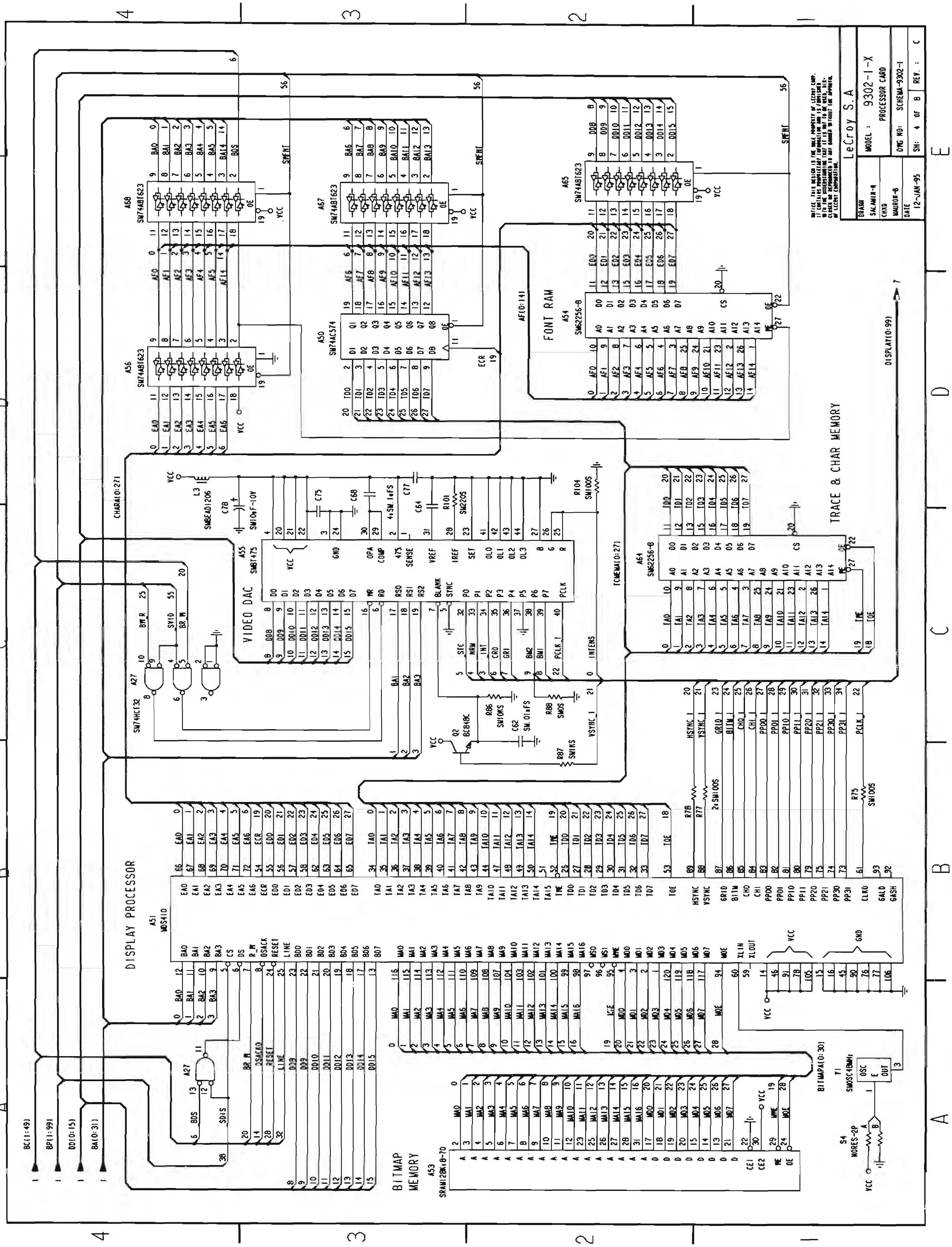
PART : 9354TM DESC : 500 MHz, QUAD CHANNEL 500 MS/s DSO, 500 KB

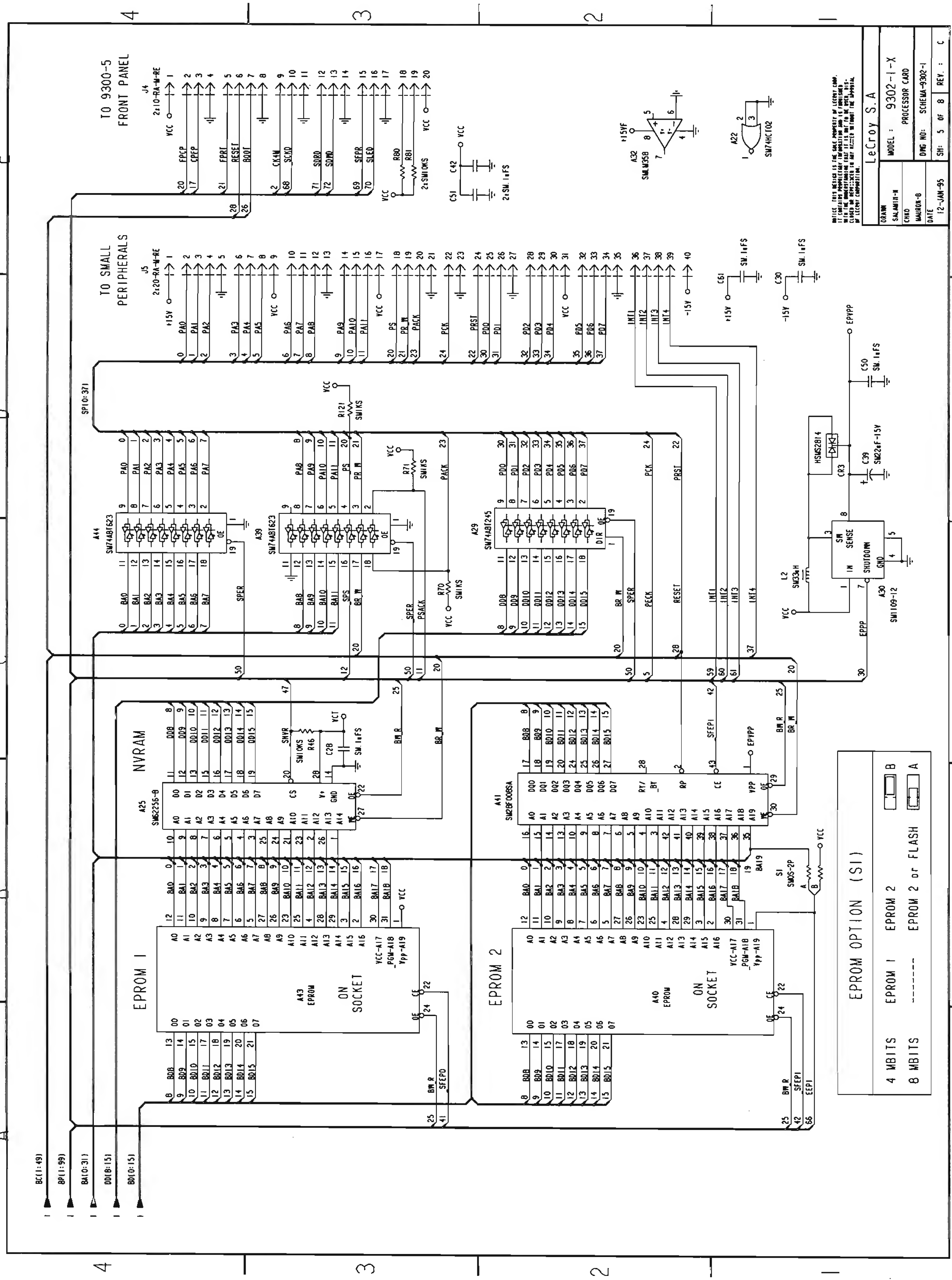
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	1
554500001	TAPPING SCREW W/U-THREAD	2
709354TM16	FRONT LABEL 9354TM	1
709354913	SERIAL NUMBER PLATE 9354TM	1
F9302-1-8	PROCESSOR CARD WITH 8Mb DRAM	1
F9350TM-21	ACQUISITION MEMORY 2 X 500 KB	2
F9354-31	MAIN CARD (FRONT END, ADC, TDC)	1
F9300-4	GPIB + RS232 INTERFACE CARD	1
F9354-5	QUAD CHANNEL FRONT PANEL	1
M935X	MECHANICAL FOR 9354TM	1
ACCESSORIES-9354	ACCESSORIES FOR 9354TM	1

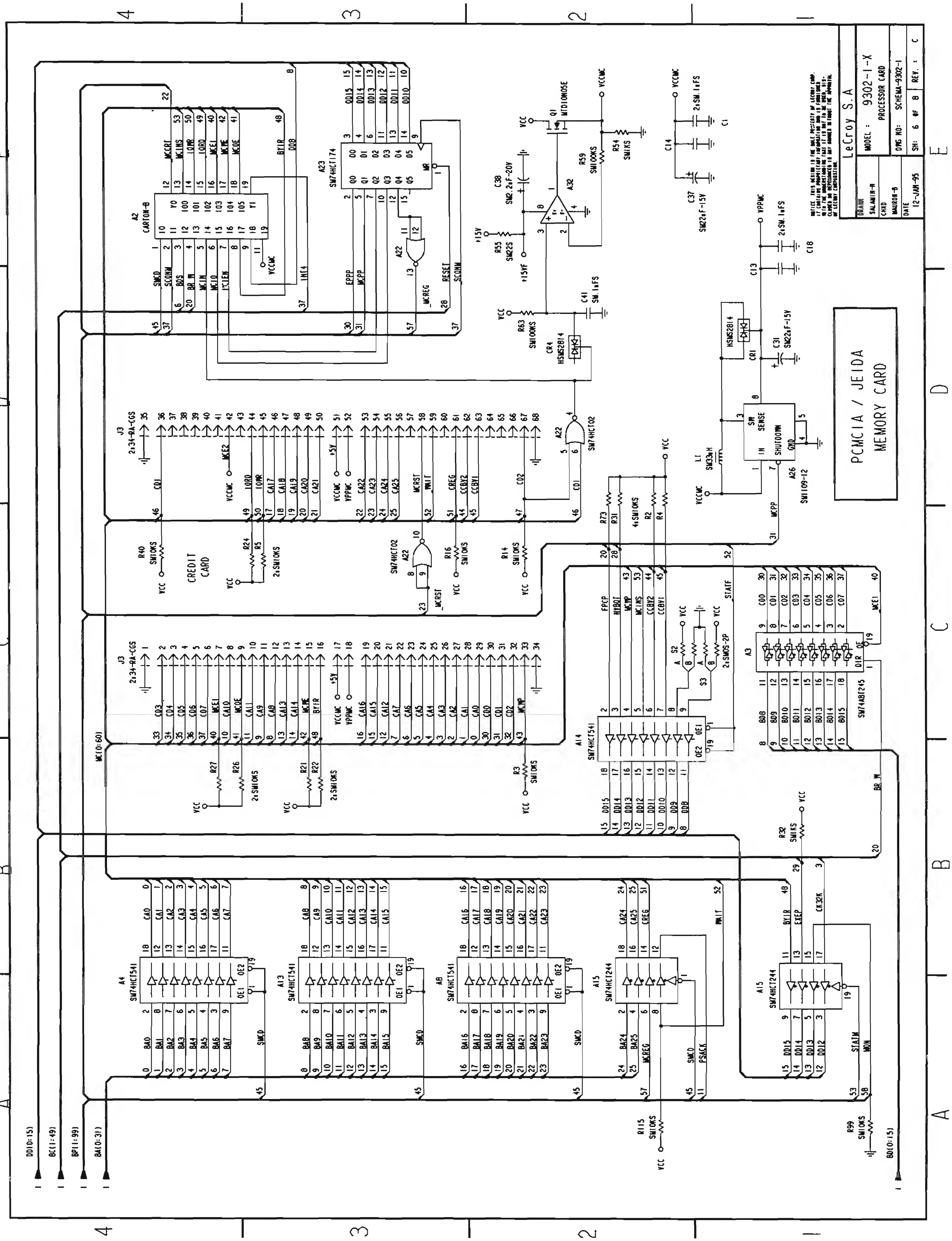

LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 1 OF 8
REV. : C
DATE 12-JAN-95
A36
SM68882FN
COPROCESSOR
A19
SM68EC030FE
CENTRAL PROCESSOR

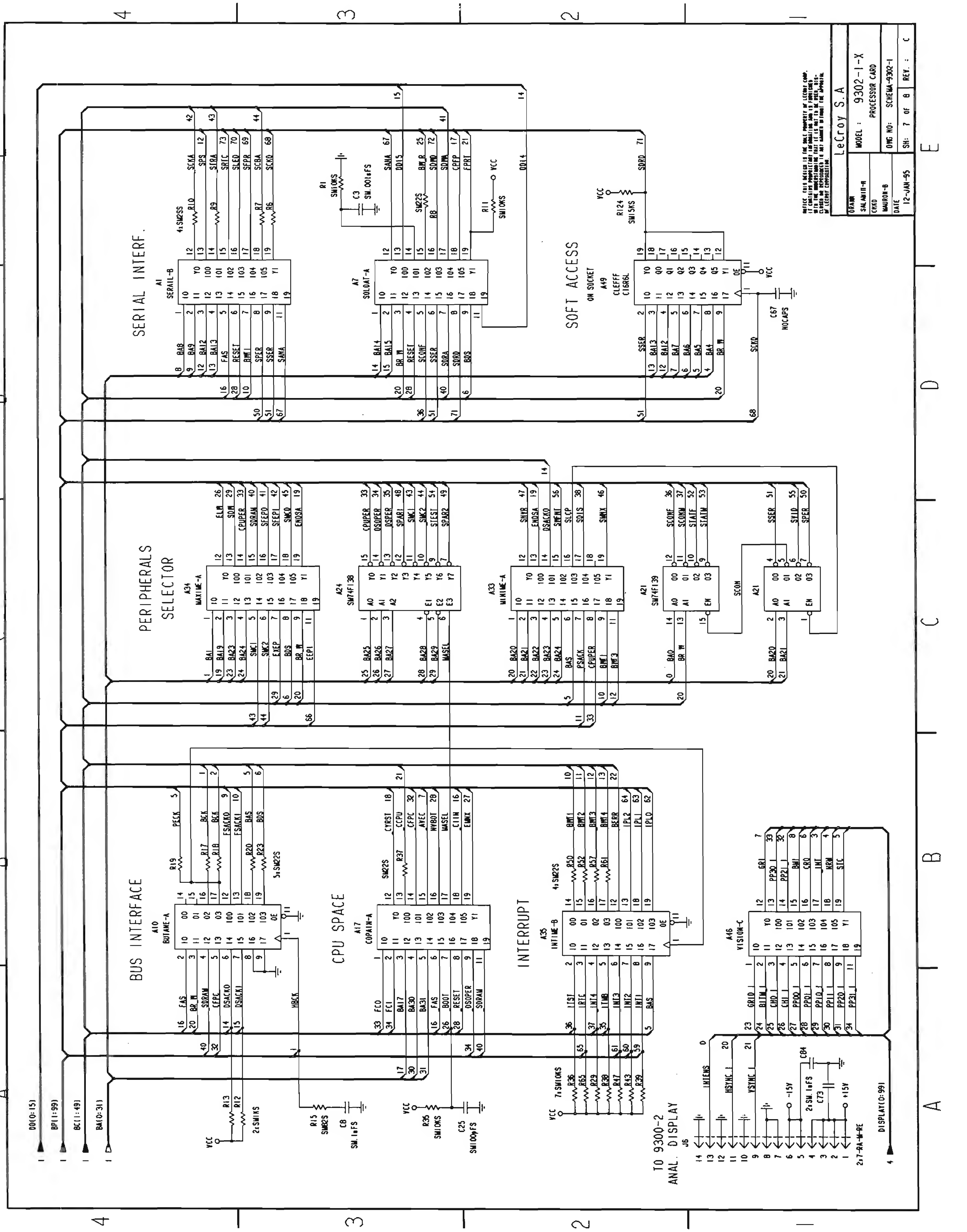

DYNAMIC RAM
SLOTB
SLOTA
BLOCK & BANK
SIZER
CONTROLER
JUMPER
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 2 of 8
REV. : C
12-JAN-95

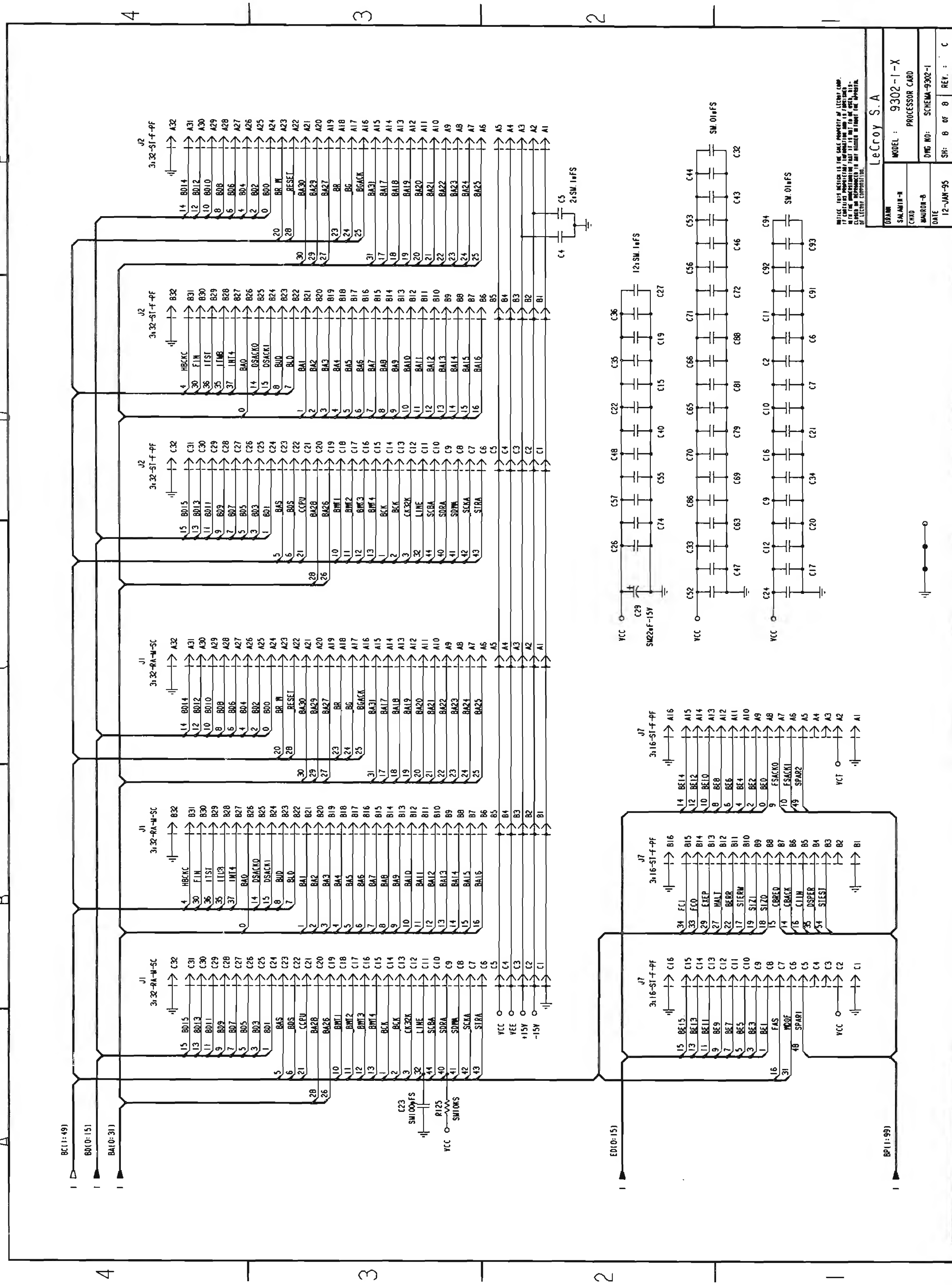

HISTO MEMORIES
REAL TIME CLOCK
MAIN OSC.
POWER MONITOR & WATCH DOG
MIN | MAX | HISTO
LeCroy S.A
9302-1-X
PROCESSOR CARD
SCHEMA-9302-1

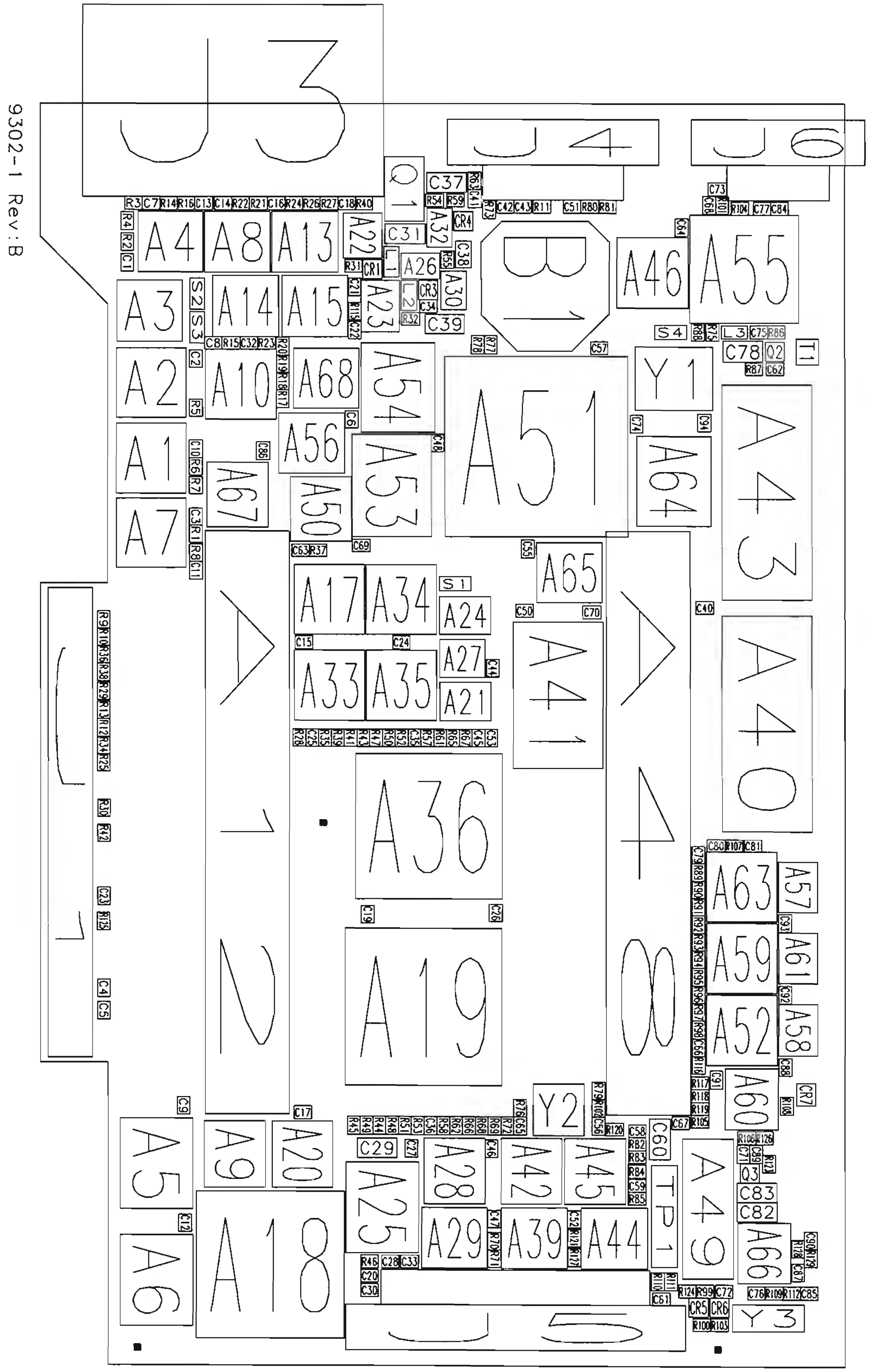

LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 4 OF 8
REV. : C
DATE 12-JAN-95
DISPLAY PROCESSOR
VIDEO DAC
FONT RAM
TRACE & CHAR MEMORY
BITMAP MEMORY

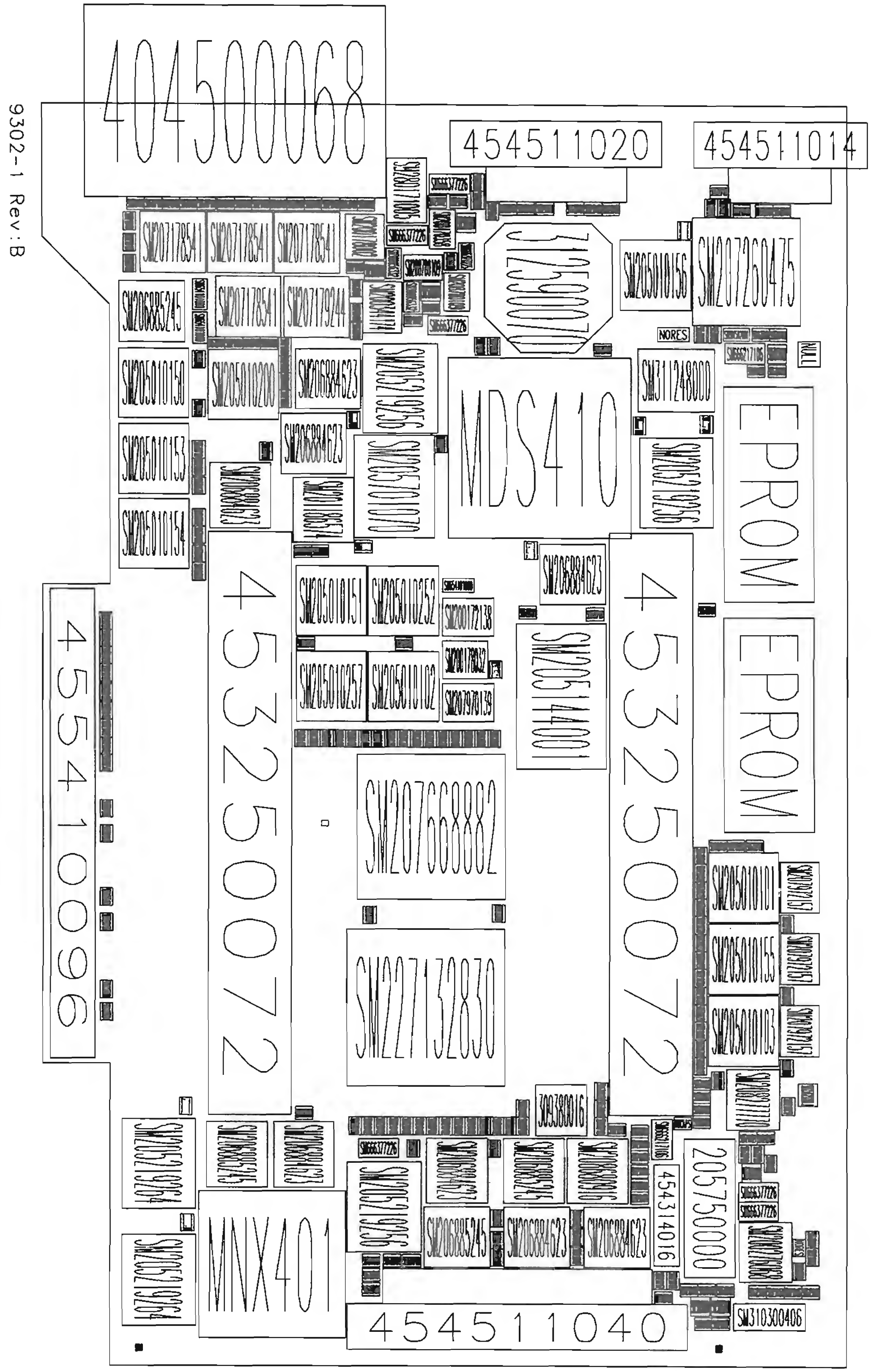

LeCroy S.A
9302-1-X
PROCESSOR CARD
TO 9300-5 FRONT PANEL
TO SMALL PERIPHERALS
NVRAM
EPROM 1
EPROM 2
EPROM OPTION (S1)
4 MBITS EPROM 1 EPROM 2
8 MBITS -------- EPROM 2 or FLASH

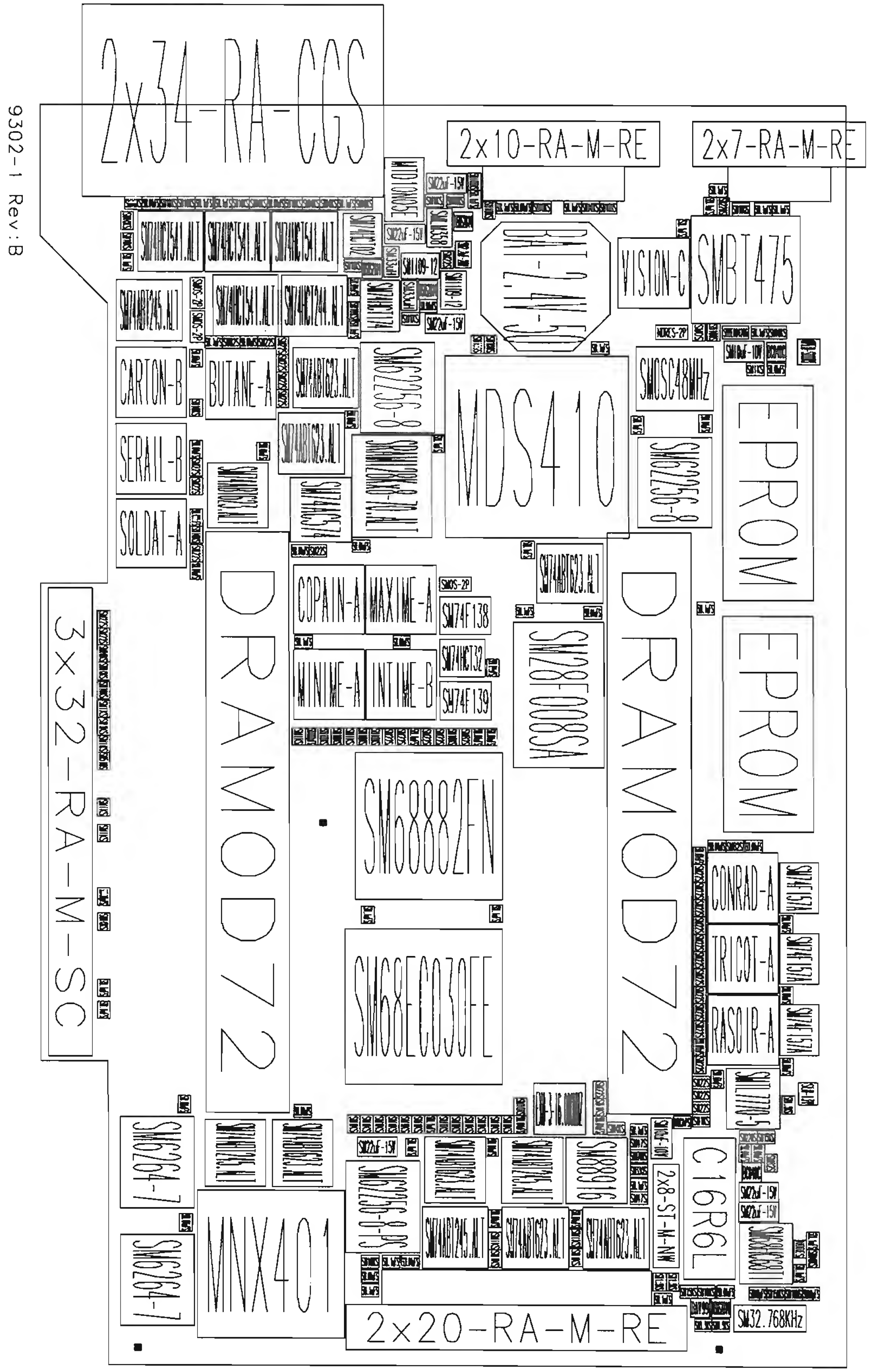

PCMCIA / JEIDA
MEMORY CARD
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
CREDIT
CARD

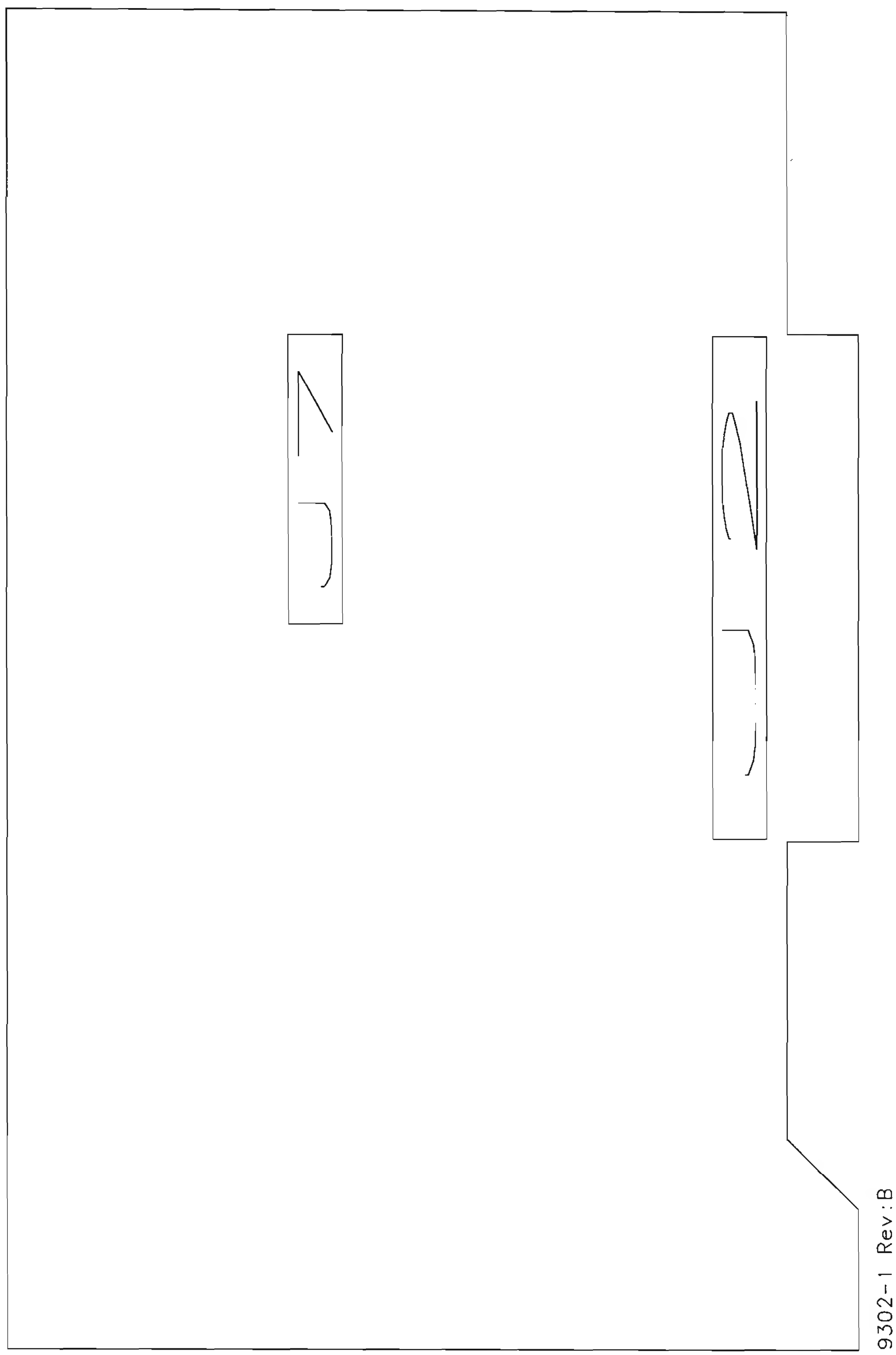

SERIAL INTERF.
SOFT ACCESS
PERIPHERALS SELECTOR
BUS INTERFACE
CPU SPACE
INTERRUPT
TO 9300-2 ANAL. DISPLAY
LeCroy S.A
9302-1-X
PROCESSOR CARD
SCHEMA-9302-1
12-JAN-95

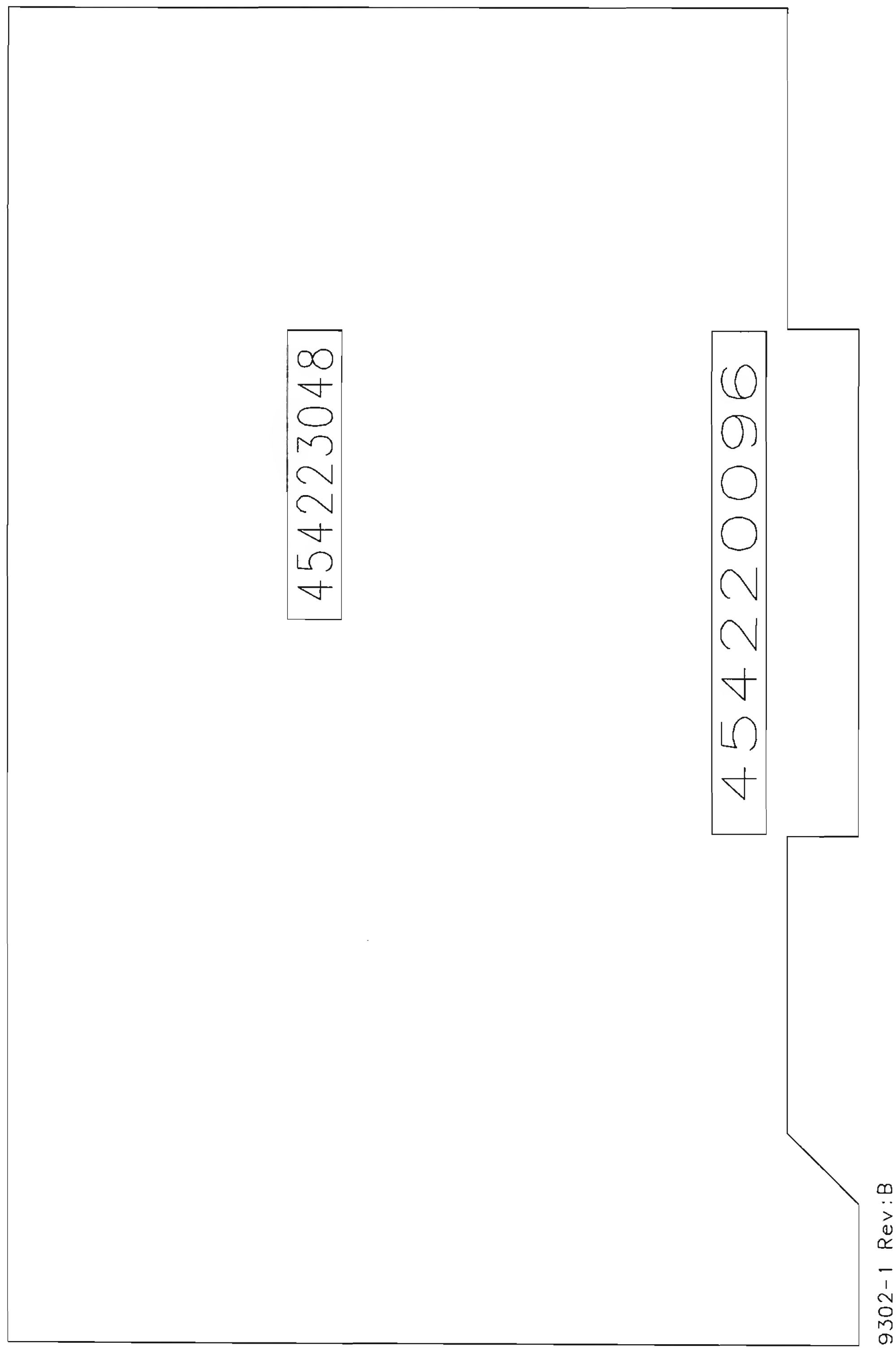

LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
DATE 12-JAN-95

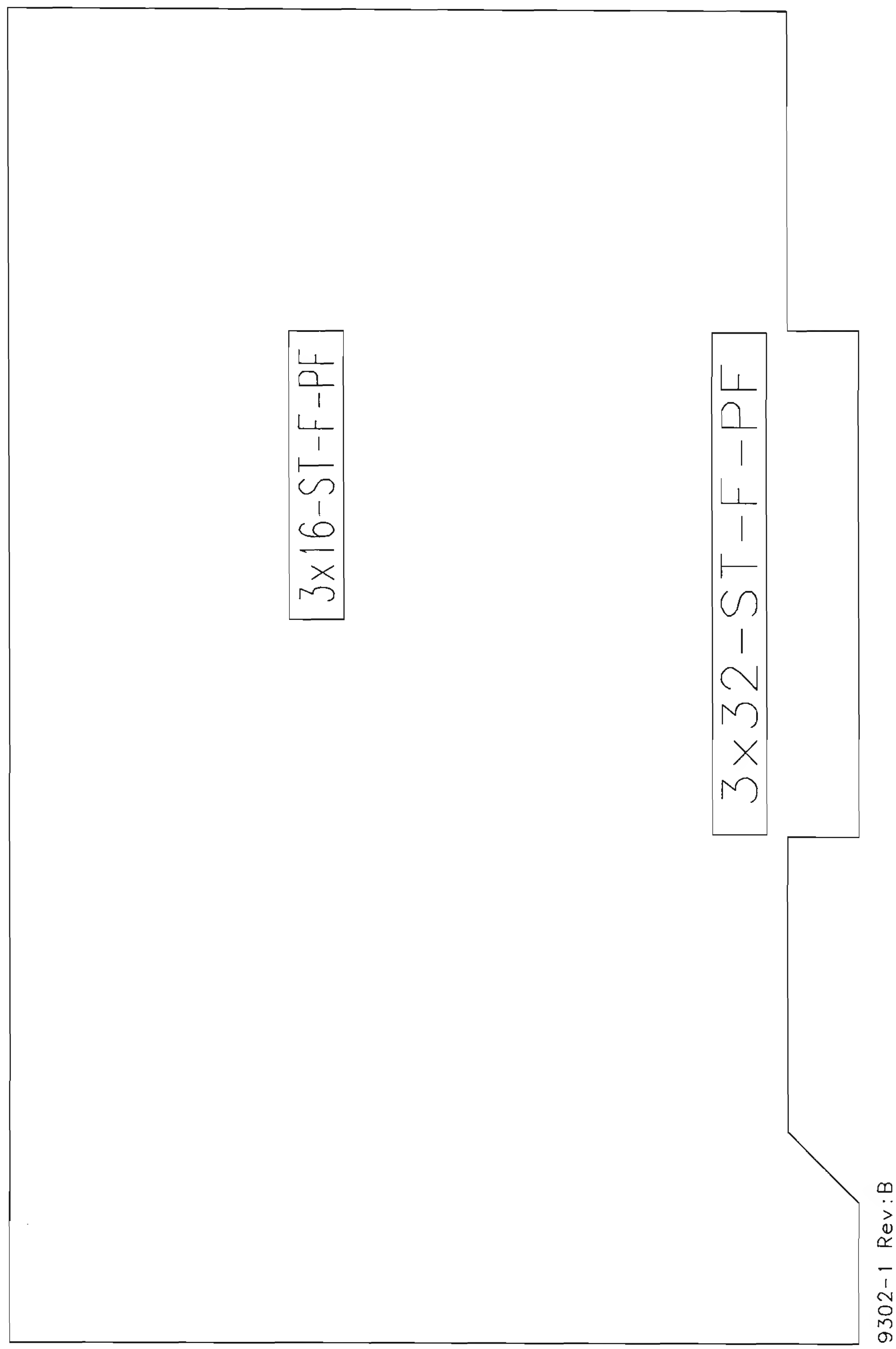

9302-1 Rev:B
J3
J4
J6
Q1
B1
A4
A8
A13
A22
A26
A32
A30
A46
A55
A3
A14
A15
A23
A2
A10
A68
A54
A51
Y1
A1
A56
A67
A50
A53
A64
A43
A7
A17
A34
A24
A65
A33
A35
A27
A21
A41
A40
A12
A36
A48
A63
A57
A59
A61
A52
A58
A19
A60
Y2
A5
A9
A20
A28
A42
A45
A49
A25
A66
A18
A29
A39
A44
TP1
A6
J5
Y3
S1
S2
S3
S4
C31
C37
C39
C78
Q2
Q3
T1
C29
C60
C83
C82


40450068
454511020
454511014
MDS410
MNX401
454511040


9302-1 Rev:B
2x34-RA-CGS
2x10-RA-M-RE
2x7-RA-M-RE
MDS410
EPROM
EPROM
DRAMOD72
DRAMOD72
3x32-RA-M-SC
SM68882FN
SM68EC030FE
MNX401
2x20-RA-M-RE
C16R6L
SMBT475
VISION-C
CARTON-B
BUTANE-A
SERAIL-B
SOLDAT-A
COPAIN-A
MAXIME-A
MINIME-A
INTIME-B
CONRAD-A
TRICOT-A
RASOIR-A
SM28F008SA
SM32.768KHz


9302-1 Rev:B


454223048
454220096
9302-1 Rev:B


3x16-ST-F-PF
3x32-ST-F-PF
9302-1 Rev:B

PART: F9302-1-X **DESC : PROCESSOR with 4 Mb or 8Mb or 16Mb RAM**

Location	Part Number	Description	Location	Part Number	Description
----------	----------------	--------------	----------	----------------	--------------
A1	SM205010153	SERAIL-B	A52	SM205010103	RASOIR-A
A2	SM205010150	CARTON-B	A53	SM205701070	SRAM 128Kx8
A3	SM206885245	SM74ABT245	A54	SM205219256	SM62256-8
A4	SM207178541	SM74HCT541	A55	SM207260475	SMBT475
A5	SM205219264	SM6264-7	A56	SM206884623	SM74ABT623
A6	SM205219264	SM6264-7	A57	SM207972157	SM74F157A
A7	SM205010154	SOLDAT-A	A58	SM207972157	SM74F157A
A8	SM207178541	SM74HCT541	A59	SM205010155	TRICOT-A
A9	SM206885245	SM74ABT245	A60	SM208277770	SMTL7770-5
A10	SM205010200	BUTANE-A	A61	SM207972157	SM74F157A
A12	453250072	DRAMOD72	A63	SM205010101	CONRAD-A
A13	SM207178541	SM74HCT541	A64	SM205219256	SM62256-8
A14	SM207178541	SM74HCT541	A65	SM206884623	SM74ABT623
A15	SM207179244	SM74HCT244	A66	SM200276068	SM68HC68T1
A17	SM205010151	COPAIN-A	A67	SM206884623	SM74ABT623
A18	MNX401	MNX401	A68	SM206884623	SM74ABT623
A19	SM227132830	SM68EC030FE	B1	312590070	BAT-2.4V-50
A20	SM206884623	SM74ABT623	C1	SM661207104	SM.1uFS
A21	SM207970139	SM74F139	C2	SM661207103	SM.01uFS
A22	SM200178002	SM74HCT02	C3	SM661207102	SM.001uFS
A23	SM200344174	SM74HCT174	C4	SM661207104	SM.1uFS
A24	SM200172138	SM74F138	C5	SM661207104	SM.1uFS
A25	SM205219256	SM62256-8-PS	C6	SM661207103	SM.01uFS
A26	SM208780109	SM1109-12	C7	SM661207103	SM.01uFS
A27	SM200178032	SM74HCT32	C8	SM661207104	SM.1uFS
A28	SM206884623	SM74ABT623	C9	SM661207103	SM.01uFS
A29	SM206885245	SM74ABT245	C10	SM661207103	SM.01uFS
A30	SM208780109	SM1109-12	C11	SM661207103	SM.01uFS
A32	SM208470358	SMLM358	C12	SM661207103	SM.01uFS
A33	SM205010257	MINIME-A	C13	SM661207104	SM.1uFS
A34	SM205010252	MAXIME-A	C14	SM661207104	SM.1uFS
A35	SM205010102	INTIME-B	C15	SM661207104	SM.1uFS
A36	SM207668882	SM68882FN	C16	SM661207103	SM.01uFS
A39	SM206884623	SM74ABT623	C17	SM661207103	SM.01uFS
A40	EPROM	EPROM	C18	SM661207104	SM.1uFS
A41	SM205144001	SM28F008SA	C19	SM661207104	SM.1uFS
A42	SM206885245	SM74ABT245	C20	SM661207103	SM.01uFS
A43	EPROM	EPROM	C21	SM661207103	SM.01uFS
A44	SM206884623	SM74ABT623	C22	SM661207104	SM.1uFS
A45	SM208680916	SM88916	C23	SM661255101	SM100pFS
A46	SM205010156	VISION-C	C24	SM661207103	SM.01uFS
A48	453250072	DRAMOD72	C25	SM661255101	SM100pFS
A49	205750000	C16R6L	C26	SM661207104	SM.1uFS
A50	SM201186574	SM74AC574	C27	SM661207104	SM.1uFS
A51	MDS410	MDS410	C28	SM661207104	SM.1uFS

PART: F9302-1-X **DESC : PROCESSOR with 4 Mb or 8Mb or 16Mb RAM**

Location	Part Number	Description
C29	SM666377226	SM22uF-15V
C30	SM661207104	SM.1uFS
C31	SM666377226	SM22uF-15V
C32	SM661207103	SM.01uFS
C33	SM661207103	SM.01uFS
C34	SM661207103	SM.01uFS
C35	SM661207104	SM.1uFS
C36	SM661207104	SM.1uFS
C37	SM666377226	SM22uF-15V
C38	SM666327225	SM2.2uF-20V
C39	SM666377226	SM22uF-15V
C40	SM661207104	SM.1uFS
C41	SM661207104	SM.1uFS
C42	SM661207104	SM.1uFS
C43	SM661207103	SM.01uFS
C44	SM661207103	SM.01uFS
C45	SM661207103	SM.01uFS
C46	SM661207103	SM.01uFS
C47	SM661207103	SM.01uFS
C48	SM661207104	SM.1uFS
C50	SM661207104	SM.1uFS
C51	SM661207104	SM.1uFS
C52	SM661207103	SM.01uFS
C53	SM661207103	SM.01uFS
C55	SM661207104	SM.1uFS
C56	SM661207103	SM.01uFS
C57	SM661207104	SM.1uFS
C58	SM661207104	SM.1uFS
C59	SM661207104	SM.1uFS
C60	SM666217106	SM10uF-10V
C61	SM661207104	SM.1uFS
C62	SM661207103	SM.01uFS
C63	SM661207103	SM.01uFS
C64	SM661207104	SM.1uFS
C65	SM661207103	SM.01uFS
C66	SM661207103	SM.01uFS
C68	SM661207104	SM.1uFS
C69	SM661207103	SM.01uFS
C70	SM661207103	SM.01uFS
C71	SM661207103	SM.01uFS
C72	SM661207103	SM.01uFS
C73	SM661207104	SM.1uFS
C74	SM661207104	SM.1uFS
C75	SM661207104	SM.1uFS
C76	SM661255180	SM18pFS
C77	SM661207104	SM.1uFS
C78	SM666217106	SM10uF-10V
C79	SM661207103	SM.01uFS
C80	SM661207103	SM.01uFS
C81	SM661207103	SM.01uFS
C82	SM666377226	SM22uF-15V
C83	SM666377226	SM22uF-15V
C84	SM661207104	SM.1uFS
C85	SM661255180	SM18pFS
C86	SM661207103	SM.01uFS
C87	SM661207104	SM.1uFS
C88	SM661207103	SM.01uFS
C89	SM661207103	SM.01uFS
C90	SM661207104	SM.1uFS
C91	SM661207103	SM.01uFS
C92	SM661207103	SM.01uFS
C93	SM661207103	SM.01uFS
C94	SM661207103	SM.01uFS
J1	455410096	3x32-RA-M-SC
J2	454220096	3x32-ST-F-PF
J3	404500068	2x34-RA-CGS
J4	454511020	2x10-RA-M-RE
J5	454511040	2x20-RA-M-RE
J6	454511014	2x7-RA-M-RE
J7	454223048	3x16-ST-F-PF
L1	SM300056332	SM33uH
L2	SM300056332	SM33uH
L3	SM301502001	SMBEAD1206
Q1	SM280171005	MTD10N05E
Q2	SM270330848	BC848C
Q3	SM270330848	BC848C
R1	SM652101103	SM10KS
R2	SM652101103	SM10KS
R3	SM652101103	SM10KS
R4	SM652101103	SM10KS
R5	SM652101103	SM10KS
R6	SM652101220	SM22S
R7	SM652101220	SM22S
R8	SM652101220	SM22S
R9	SM652101220	SM22S
R10	SM652101220	SM22S
R11	SM652101103	SM10KS
R12	SM652101102	SM1KS
R13	SM652101102	SM1KS
R14	SM652101103	SM10KS

PART: F9302-1-X **DESC : PROCESSOR with 4 Mb or 8Mb or 16Mb RAM**

Location	Part Number	Description	Location	Part Number	Description
R15	SM652101820	SM82S	R63	SM652101104	SM100KS
R16	SM652101103	SM10KS	R65	SM652101103	SM10KS
R17	SM652101220	SM22S	R66	SM652101102	SM1KS
R18	SM652101220	SM22S	R67	SM652101820	SM82S
R19	SM652101220	SM22S	R68	SM652101102	SM1KS
R20	SM652101220	SM22S	R69	SM652101102	SM1KS
R21	SM652101103	SM10KS	R70	SM652101102	SM1KS
R22	SM652101103	SM10KS	R71	SM652101102	SM1KS
R23	SM652101220	SM22S	R72	SM652101102	SM1KS
R24	SM652101103	SM10KS	R73	SM652101103	SM10KS
R25	SM652101511	SM510S	R75	SM652101101	SM100S
R26	SM652101103	SM10KS	R76	SM652101103	SM10KS
R27	SM652101103	SM10KS	R77	SM652101101	SM100S
R28	SM652101102	SM1KS	R78	SM652101101	SM100S
R29	SM652101103	SM10KS	R79	SM652101220	SM22S
R30	SM652101102	SM1KS	R80	SM652101103	SM10KS
R31	SM652101103	SM10KS	R81	SM652101103	SM10KS
R32	SM652101102	SM1KS	R82	SM652101470	SM47S
R34	SM652101102	SM1KS	R83	SM652101474	SM470KS
R35	SM652101103	SM10KS	R84	SM652101331	SM330S
R36	SM652101103	SM10KS	R85	SM652101470	SM47S
R37	SM652101220	SM22S	R86	SM652101103	SM10KS
R38	SM652101103	SM10KS	R87	SM652101102	SM1KS
R39	SM652101103	SM10KS	R88	SM654101000	SM0S
R40	SM652101103	SM10KS	R89	SM652101220	SM22S
R41	SM652101102	SM1KS	R90	SM652101220	SM22S
R42	SM652101102	SM1KS	R91	SM652101220	SM22S
R43	SM652101103	SM10KS	R92	SM652101220	SM22S
R44	SM652101102	SM1KS	R93	SM652101220	SM22S
R45	SM652101102	SM1KS	R94	SM652101220	SM22S
R46	SM652101103	SM10KS	R95	SM652101220	SM22S
R47	SM652101103	SM10KS	R96	SM652101220	SM22S
R48	SM652101102	SM1KS	R97	SM652101220	SM22S
R49	SM652101102	SM1KS	R98	SM652101220	SM22S
R50	SM652101220	SM22S	R99	SM652101103	SM10KS
R51	SM652101102	SM1KS	R100	SM652101332	SM3.3KS
R52	SM652101220	SM22S	R101	SM652101221	SM220S
R53	SM652101102	SM1KS	R102	SM652101102	SM1KS
R54	SM652101102	SM1KS	R103	SM652101152	SM1.5KS
R55	SM652101220	SM22S	R104	SM652101101	SM100S
R57	SM652101220	SM22S	R105	SM652101102	SM1KS
R58	SM652101102	SM1KS	R106	SM652101221	SM220S
R59	SM652101104	SM100KS	R107	SM652101820	SM82S
R61	SM652101220	SM22S	R108	SM652101152	SM1.5KS
R62	SM652101102	SM1KS	R109	SM652101154	SM150KS

PART: F9302-1-X **DESC : PROCESSOR with 4 Mb or 8Mb or 16Mb RAM**

Location	Part Number	Description	Location	Part Number	Description
R110	SM652101152	SM1.5KS	R127	SM652101102	SM1KS
R111	SM652101152	SM1.5KS	R129	SM652101103	SM10KS
R112	SM652101106	SM10MS	S1	SM654101000	SM0S-2P
R115	SM652101103	SM10KS	S2	SM654101000	SM0S-2P
R116	SM652101220	SM22S	S3	SM654101000	SM0S-2P
R117	SM652101220	SM22S	Y1	SM311248000	SMOSC48MHz
R118	SM652101220	SM22S	Y2	309380016	16.000MHZ
R119	SM652101220	SM22S	Y3	SM310300406	SM32.768KHz
R120	SM652101103	SM10KS	CR1	SM232032814	HSMS2814
R121	SM652101102	SM1KS	CR3	SM232032814	HSMS2814
R123	SM652101820	SM82S	CR4	SM232032814	HSMS2814
R124	SM652101153	SM15KS	CR5	SM236030099	BAV99 SOT23
R125	SM652101103	SM10KS	CR6	SM232032814	HSMS2814
R126	SM652101153	SM15KS	CR7	SM256232013	SLM-13V
			TP1	454314016	2x8-ST-M-NW

PART: F9302-1-4 **DESC: PROCESSOR CARD with 4MB DRAM for 9354A & 9354T**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205800130	MODULE DRAM 1MX32 BIT	1
454370002	SHUNT 2 POS	2
S9302-1	PROCESSOR CARD WHOUT DRAM	1

PART: F9302-1-8 **DESC: PROCESSOR CARD with 8MB DRAM for 9354AM & 9354TM**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205800230	MODULE DRAM 2MX32 BIT	1
454370002	SHUNT 2 POS	2
S9302-1	PROCESSOR CARD WHOUT DRAM	1

PART: F9302-1-16 **DESC: PROCESSOR CARD with 16MB DRAM for 9354AL**

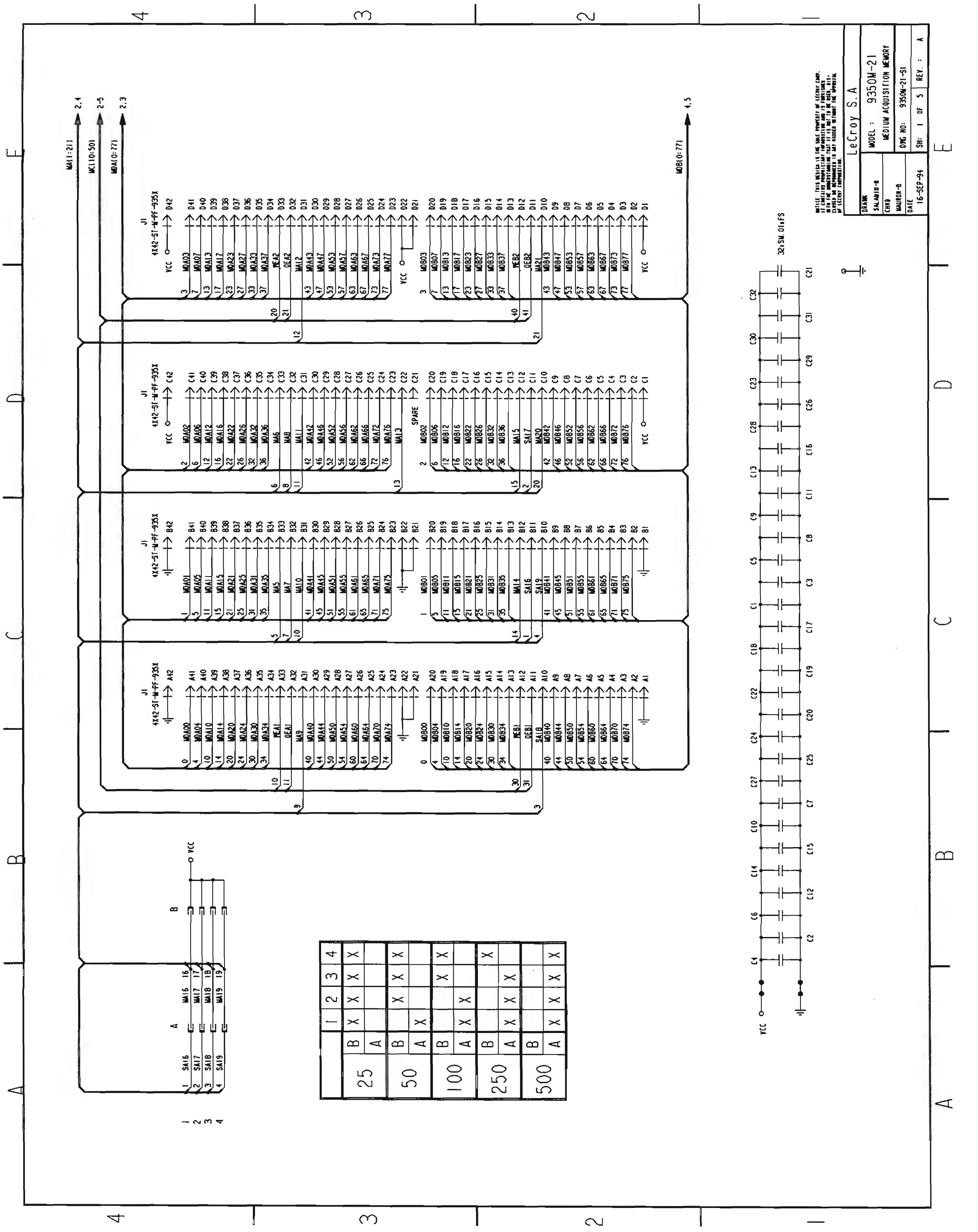
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205800230	MODULE DRAM 2MX32	2
454370002	SHUNT 2 POS	2
S9302-1	PROCESSOR CARD WHOUT DRAM	1

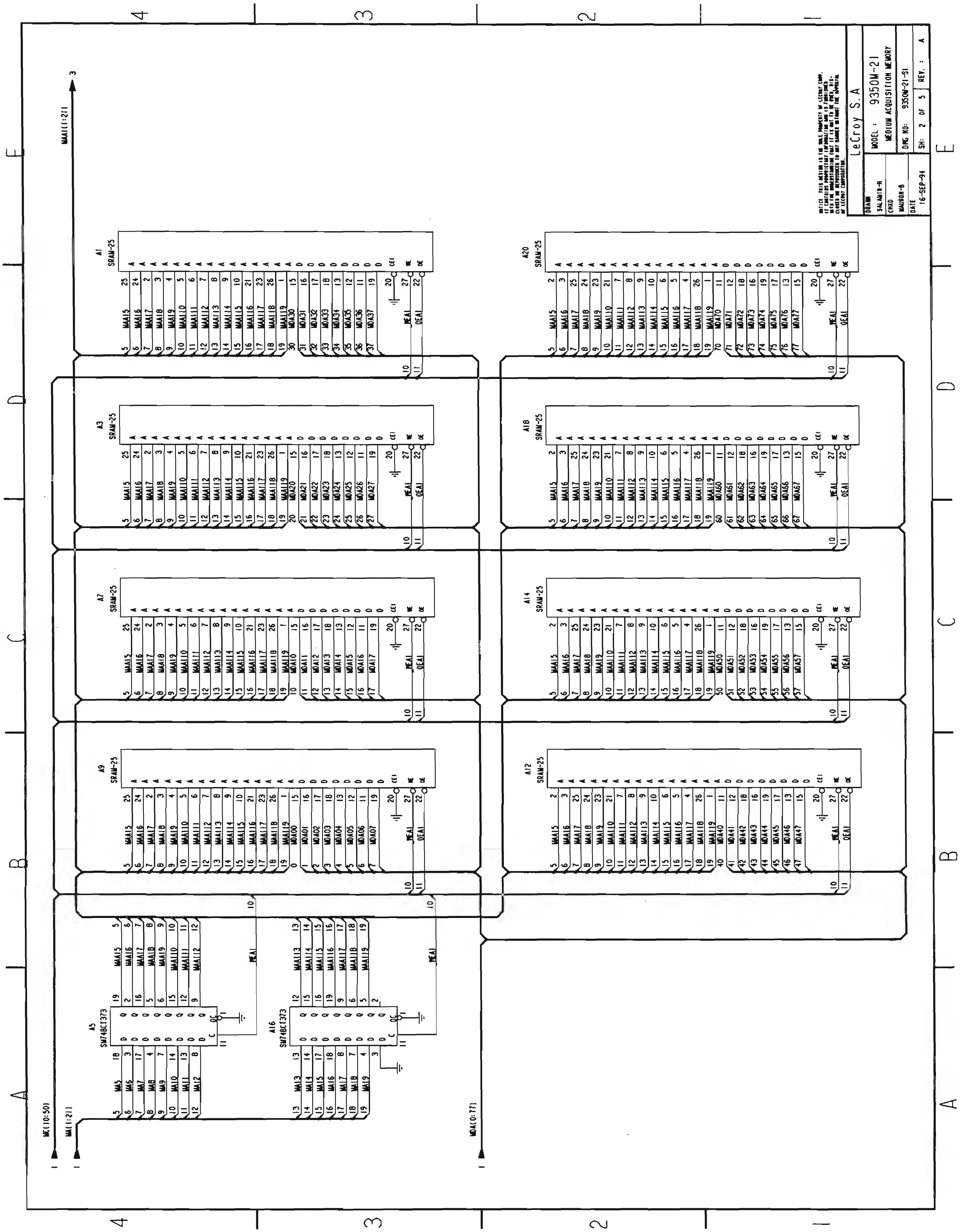
PART: S9302-1 **DESC: PROCESSOR CARD without DRAM**

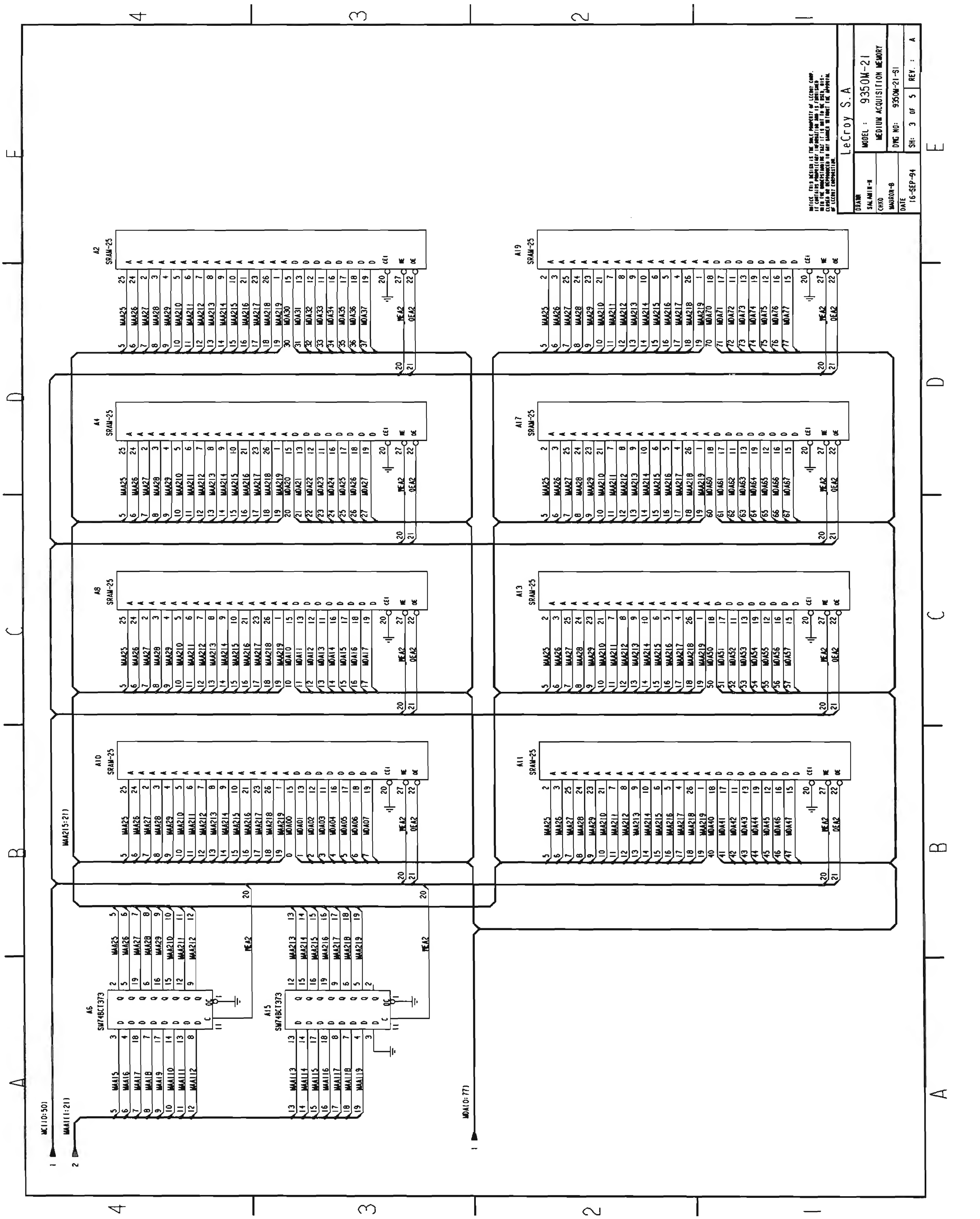
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
309380016	CRYSTAL OSC (PROGR) 16 MHZ	1
312590070	BATTERY LITHIUM 3V 70MAH	1
400331020	SOCKET IC ST DIP-20	1
404500068	CONN BD TO BD 68 POS	1
453250072	CONN PC EDGE/SOLD TAIL 72	2
454314016	HDR DIP SOLD TO MALE 16	1
454511014	HDR SOLD TAIL/MALE/14/RT	1
454511020	HDR SOLD TAIL/MALE 20	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
455410096	CONN RT ANGLE MALE 96 S-CLIP	1
550130108	SCREW CYL HD M3X8	2
552130101	NUT HEX M3	2
719302103	PC BD PREASS'Y 9302-1	1
MDS410	IC RSDP GATE ARRAY MDS410	1
MNX401	ICMIN MAX GATEARR. MNX401	1
SM200172138	IC 3-8 DECODER 74F138	1
SM200178002	IC 2-INPUT NOR HCT02	1
SM200178032	IC 2-IN OR HCT32	1
SM200276068	IC RTC SERIAL 68HC68T1	1
SM200344174	IC HEX D-FLOP HCT174	1
SM201186574	IC OCTAL D-TYP FLOP 74AC574	1
SM205010101	PROGRAMMED GAL CONRAD-A	1
SM205010102	PROGRAMMED GAL INTIME-B	1
SM205010103	PROGRAMMED GAL RASOIR-A	1
SM205010150	PROGRAMMED GAL CARTON-B	1
SM205010151	PROGRAMMED GAL COPAIN-A	1
SM205010153	PROGRAMMED GAL SERAIL-C	1
SM205010154	PROGRAMMED GAL SOLDAT-A	1
SM205010155	PROGRAMMED GAL TRICOT-A	1
SM205010156	PROGRAMMED GAL VISION-C	1
SM205010200	PROGRAMMED GAL BUTANE-A	1
SM205010252	PROGRAMMED GAL MAXIME-A	1
SM205010257	PROGRAMMED GAL MINIME-A	1
SM205144001	8-MBIT FLASH MEM 28F008SA	1
SM205219256	IC 32K X 8 SRAM MS62256	3
SM205219264	IC 8K X 8 SRAM 70 NSEC 6264	2
SM205701070	IC 128KX8 STAT RAM 70 NS	1
SM206884623	IC OCTAL BUS TRANSCVR ABT623	8
SM206885245	IC BUS TRANSCVR ABT245	4
SM207178541	IC BUFFER/LINE DR HCT541	4
SM207179244	IC BUF/LINE DRIV HCT244	1
SM207260475	IC RAMDAC 256W 50MHZ BT475	1
SM207668882	IC CO PROCESSOR 68882	1
SM207970139	IC DECODER/DEMUX 74F139	1

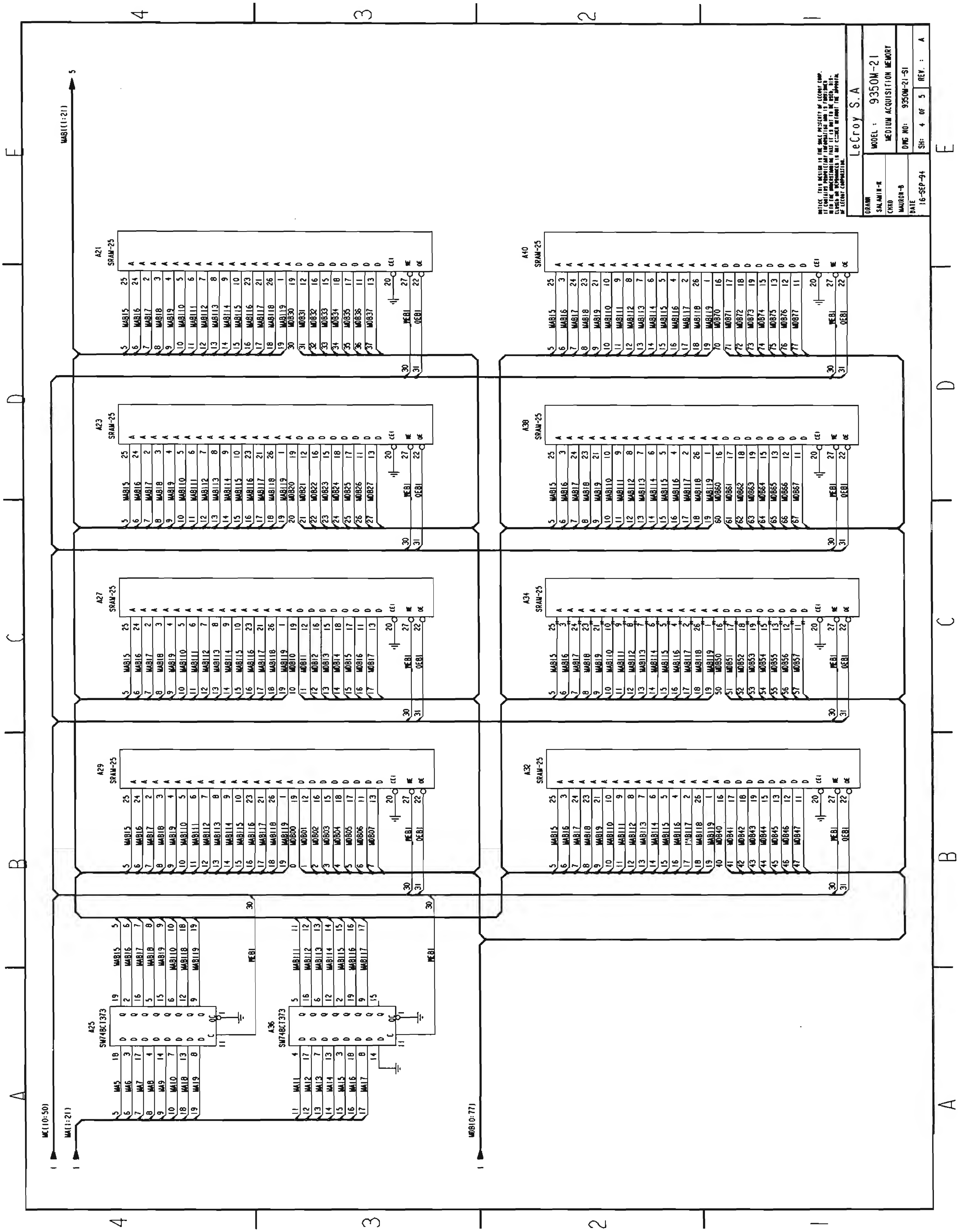
PART: S9302-1 **DESC: PROCESSOR CARD without DRAM**

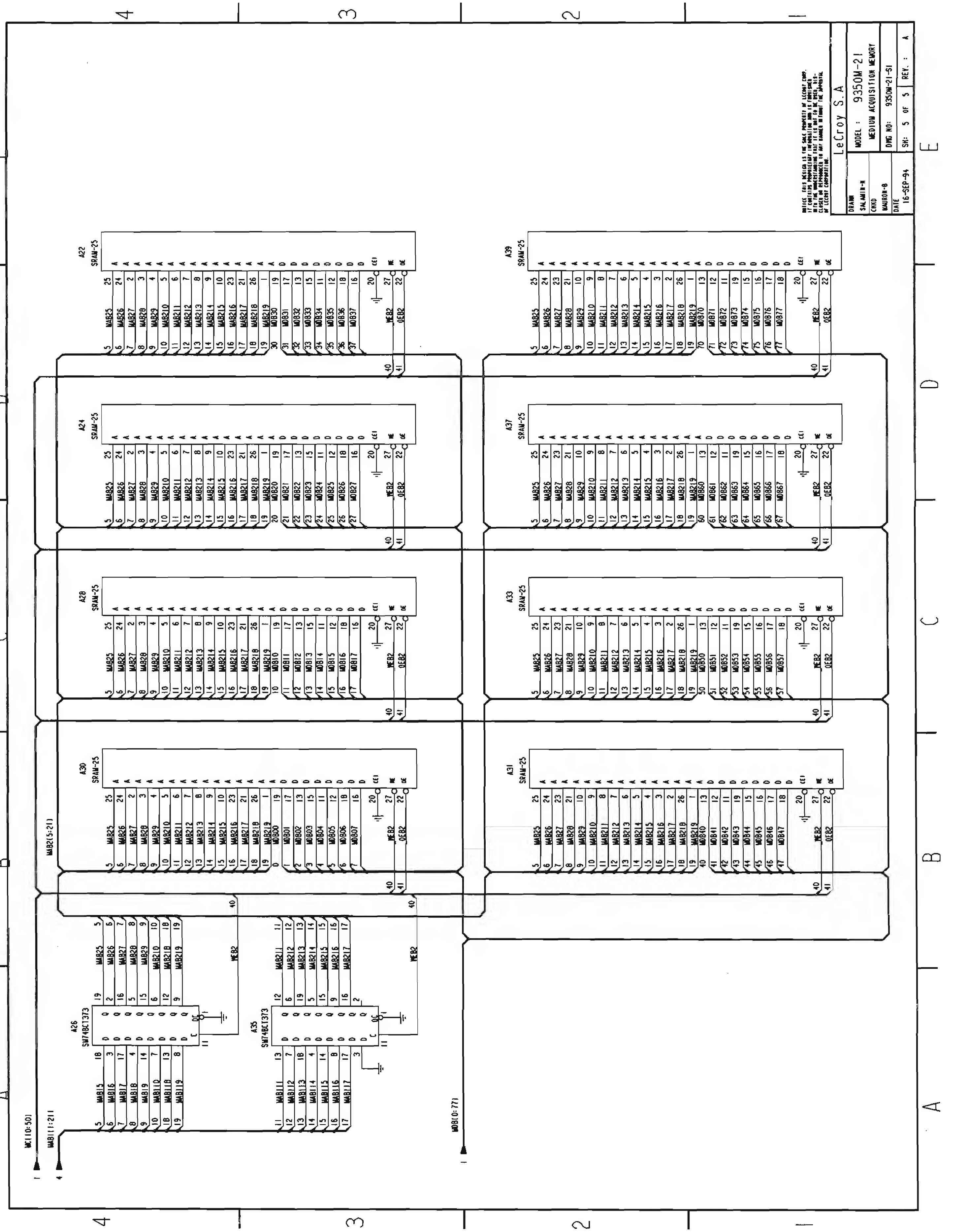
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM207972157	IC DATA SEL/MUX 74F157A	3
SM208277770	IC DUAL PWR SUPPLY SUP 7770-5	1
SM208470358	IC DUAL OP AMP 358D	1
SM208680916	IC LOW SKEW CLOCK DRIVER 88916	1
SM208780109	IC MICROPOWER DC-DC CONV.	2
SM227132830	IC 32-BIT U PROC 68EC030	1
SM232032814	DIODE 2814	4
SM236030099	DIODE SO-PKG BAV99	1
SM256232013	DIODE LIGHT EMITTING RED	1
SM270330848	TRANSISTOR NPN BC848C	2
SM280171005	TRANS POWER MOSFET MTD10N05E	1
SM300056332	INDUCTOR WOUND 33 UH	2
SM301502001	BEAD (FERRITE CHIP)	1
SM310300406	CRYSTAL 32768HZ	1
SM311248000	CRYSTAL OSCILLATOR 48MHZ	1
SM652101101	RES CHIP (E24) 1% 100 OHM	4
SM652101102	RES CHIP (E24) 1% 1 K	28
SM652101103	RES CHIP (E24) 1% 10 K	34
SM652101104	RES CHIP (E24) 1% 100 K	2
SM652101106	RES CHIP (E24) 1% 10 MEG	1
SM652101152	RES CHIP (E24) 1% 1.5 K	4
SM652101153	RES CHIP (E24) 1% 15 K	2
SM652101154	RES CHIP (E24) 1% 150 K	1
SM652101220	RES CHIP (E24) 1% 22 OHMS	31
SM652101221	RES CHIP (E24) 1% 220 OHM	2
SM652101331	RES CHIP (E24) 1% 330 OHM	1
SM652101332	RES CHIP (E24) 1% 3.3 K	1
SM652101470	RES CHIP (E24) 47 OHMS	2
SM652101474	RES CHIP (E24) 1% 470 K	1
SM652101511	RES CHIP (E24) 1% 510 OHM	1
SM652101820	RES CHIP (E24) 1% 82 OHMS	4
SM654101000	CHIP JUMPER ZERO OHMS	4
SM661207102	CAP CERA CHIP 10% .001UF	1
SM661207103	CAP CERA CHIP 20% .01UF (0805)	41
SM661207104	CAP CERA CHIP 20% .1 UF	36
SM661255101	CAP CERA CHIP 5% 100 PF	2
SM661255180	CAP CERA CHIP 5% 18PF	2
SM666217106	CAP MOLD TANT CHIP 10 UF	2
SM666327225	CAP MOLD TANT CHIP 2.2 UF	1
SM666377226	CAP MOLD TANT CHIP 22 UF	6

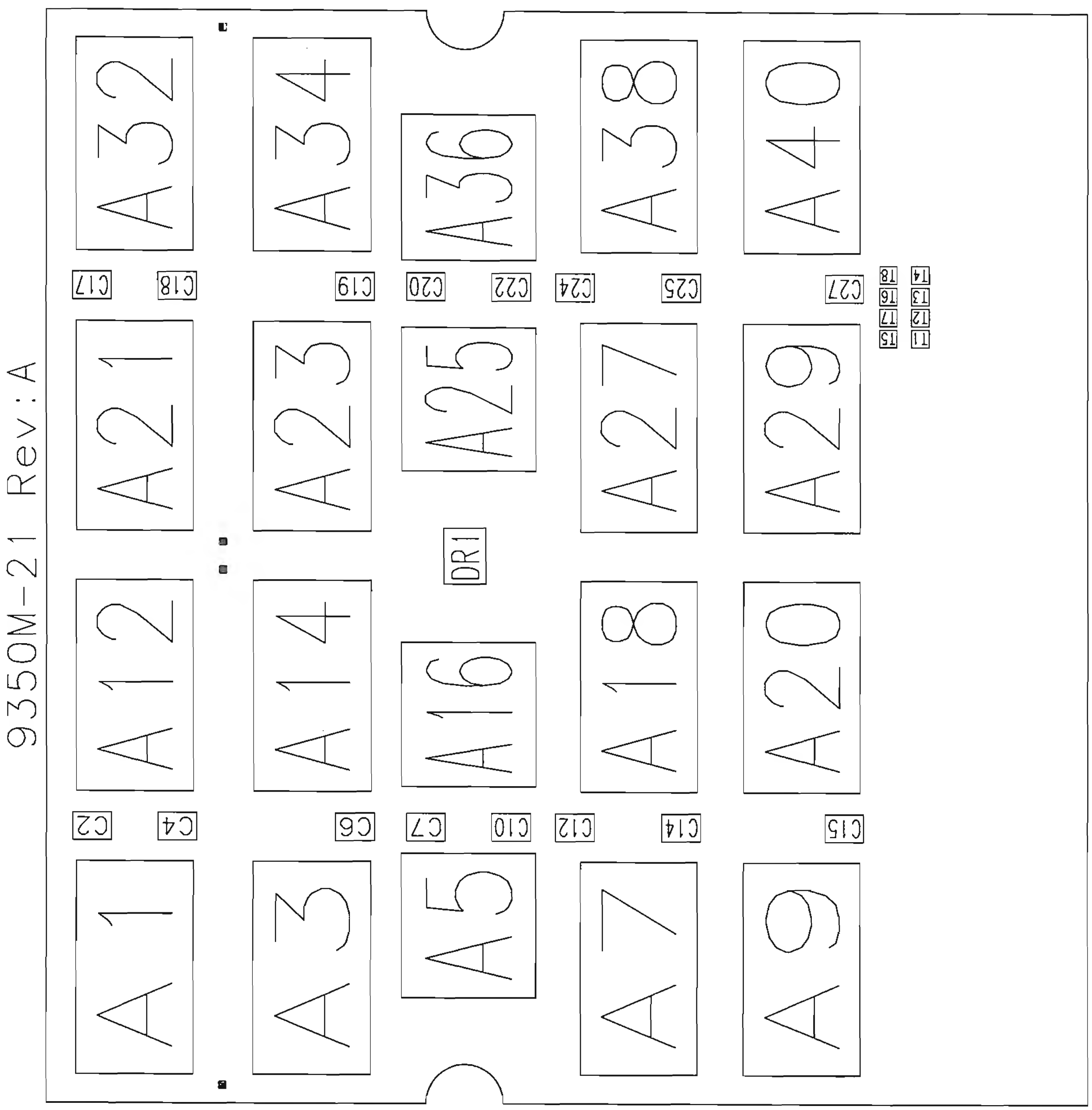

LeCroy S.A
MODEL : 9350M-21
MEDIUM ACQUISITION MEMORY
DWG NO: 9350M-21-S1
SH: 1 OF 5
REV. : A
DATE 16-SEP-94


LeCroy S.A
MODEL : 9350M-21
MEDIUM ACQUISITION MEMORY
DWG NO: 9350M-21-S1
SH: 2 OF 5
REV. : A
DATE 16-SEP-94
A1 SRAM-25
A3 SRAM-25
A7 SRAM-25
A9 SRAM-25
A20 SRAM-25
A18 SRAM-25
A14 SRAM-25
A12 SRAM-25
A5 SN74BCT373
A16 SN74BCT373
MAA(11:21)
MDA(0:77)


LeCroy S.A
MODEL : 9350M-21
MEDIUM ACQUISITION MEMORY
DWG NO: 9350M-21-51
SH: 3 OF 5
REV. : A
DRAWN SALAMIN-M
CHKD MAURON-B
DATE 16-SEP-94


LeCroy S.A
MODEL : 9350M-21
MEDIUM ACQUISITION MEMORY
DWG NO: 9350M-21-51
SH: 4 OF 5
REV. : A
16-SEP-94


LeCroy S.A
MODEL : 9350M-21
MEDIUM ACQUISITION MEMORY
DRAWN SALAMIN-R
CHKD MAURON-B
DATE 16-SEP-94
DWG NO: 9350M-21-51
SH: 5 OF 5
REV. : A


9350M-21 Rev:A
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A27
A29
A32
A34
A36
A38
A40
DR1
C2
C4
C6
C7
C10
C12
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C20
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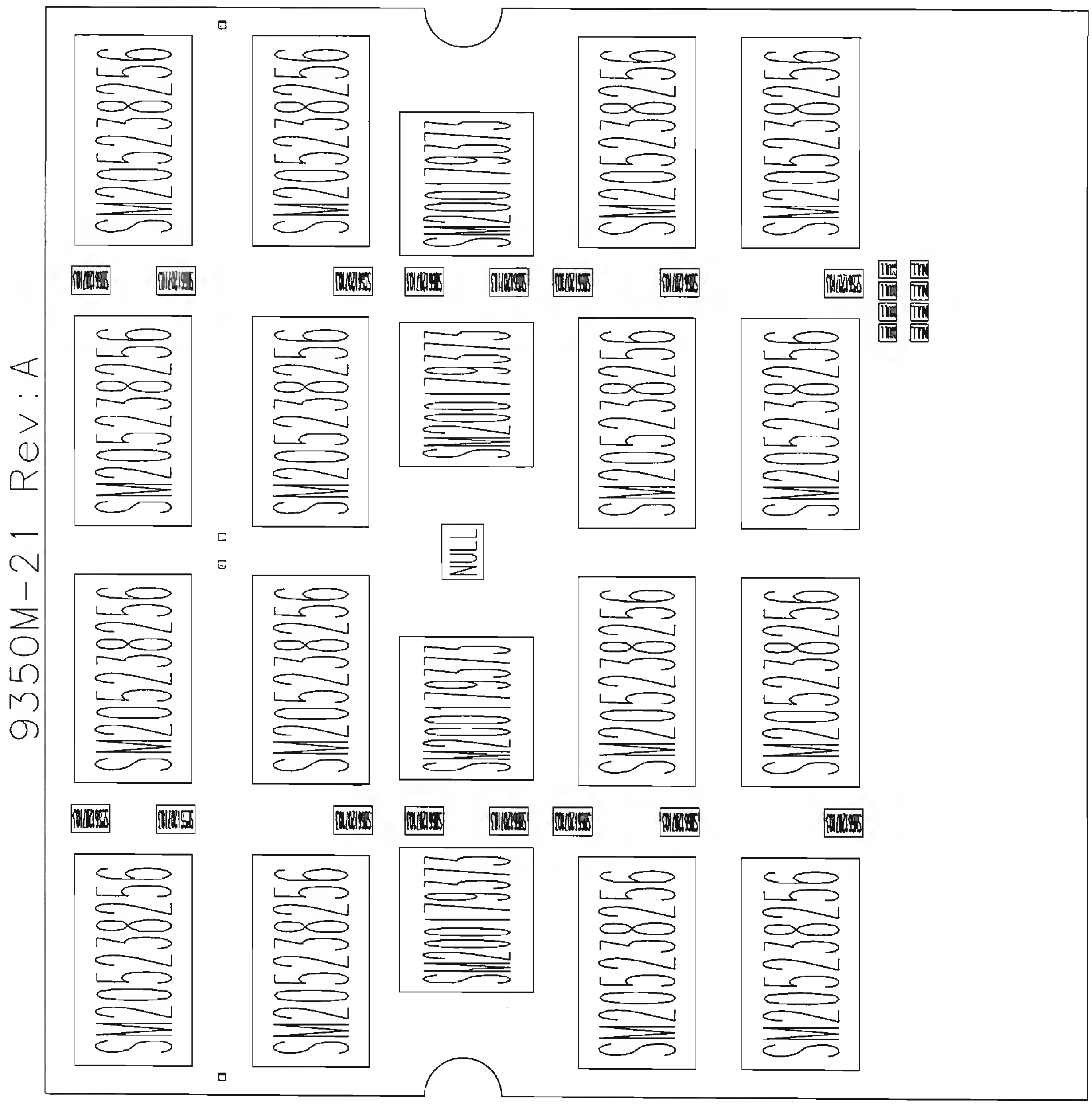
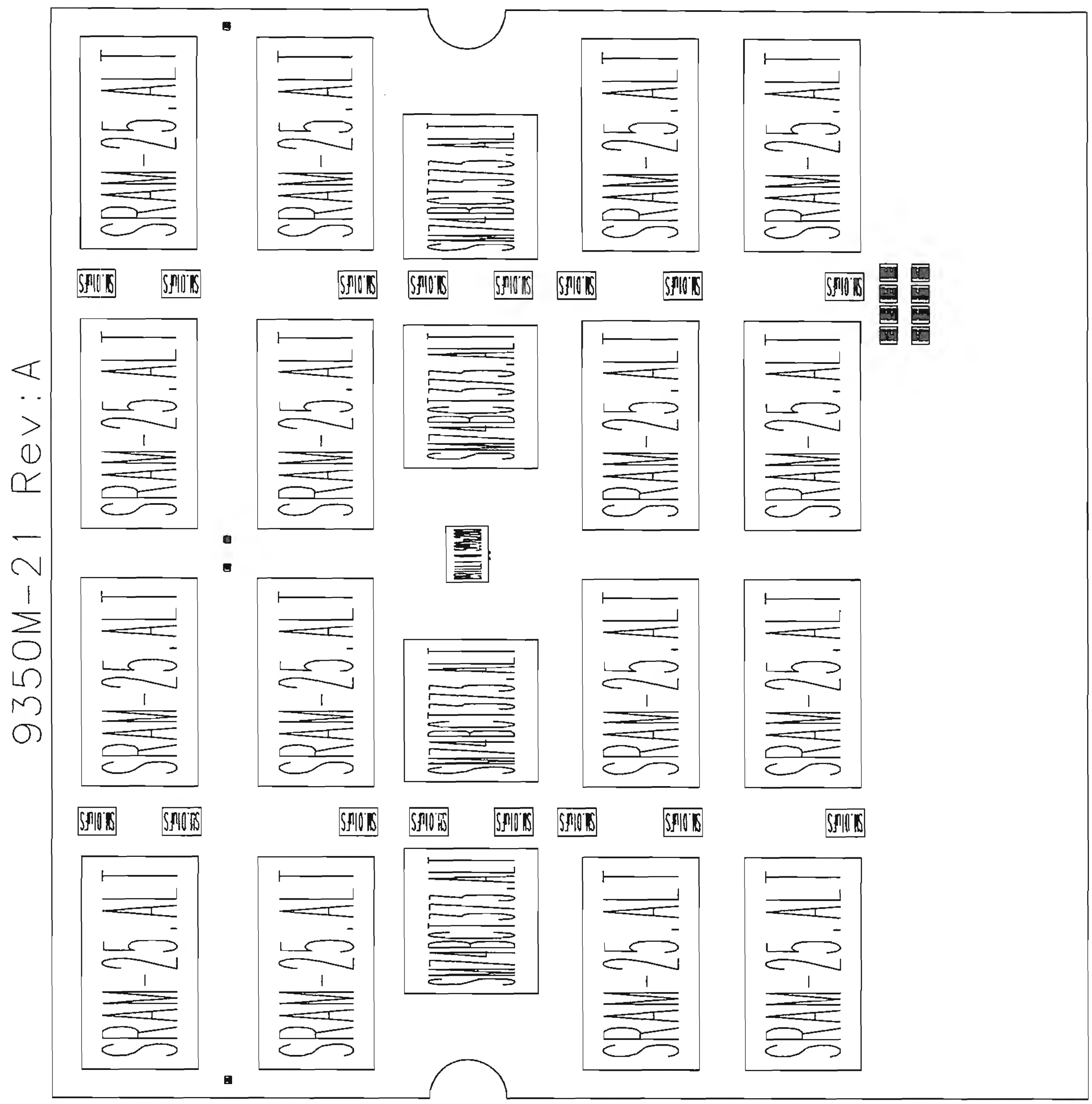
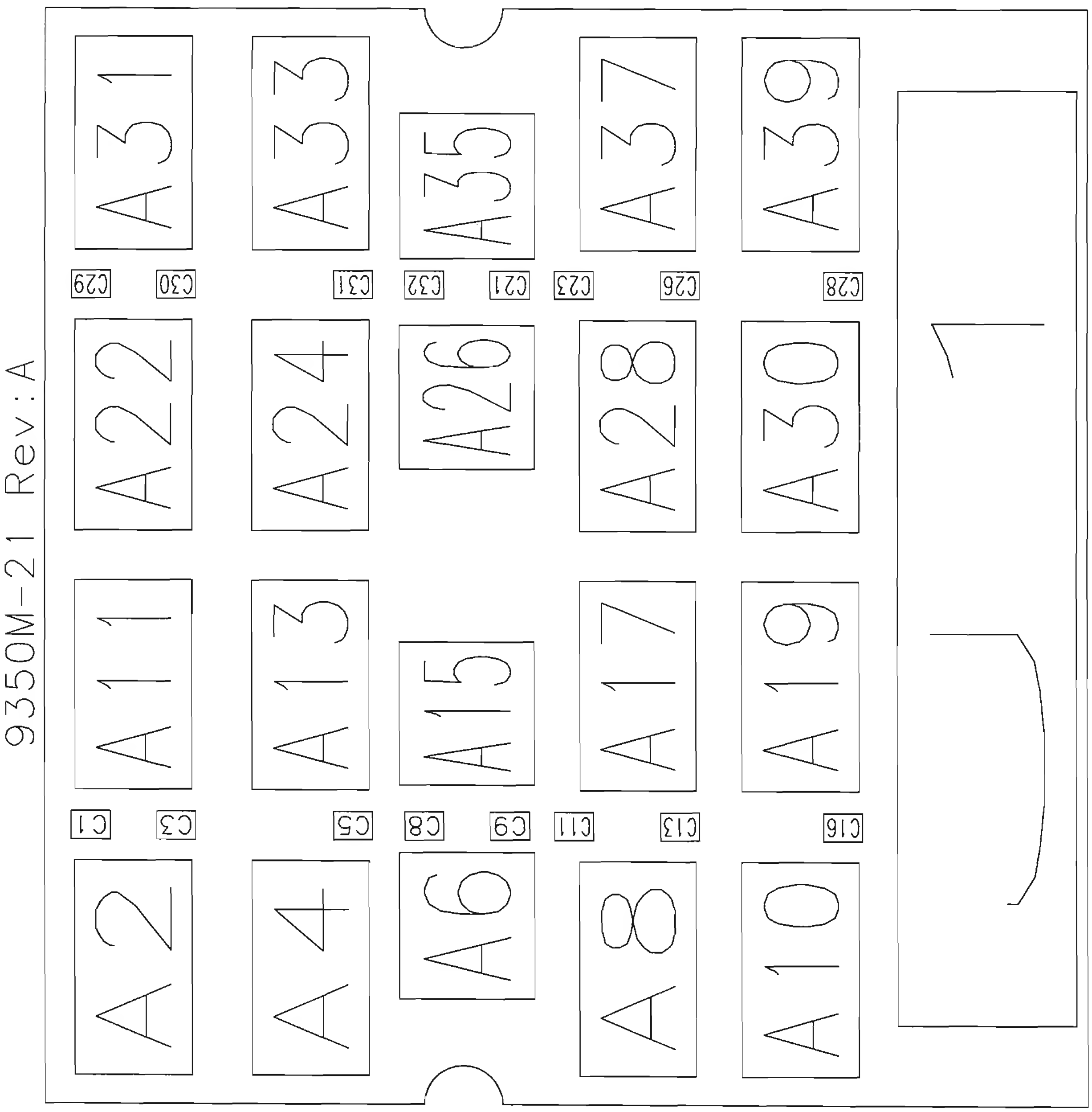
C24
C25
C27


9350M-21 Rev:A
NULL


9350M-21 Rev:A
SRAM-25.ALT


9350M-21 Rev:A
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C29
C30
C31
C32
C21
C23
C26
C28
A22
A24
A26
A28
A30
A11
A13
A15
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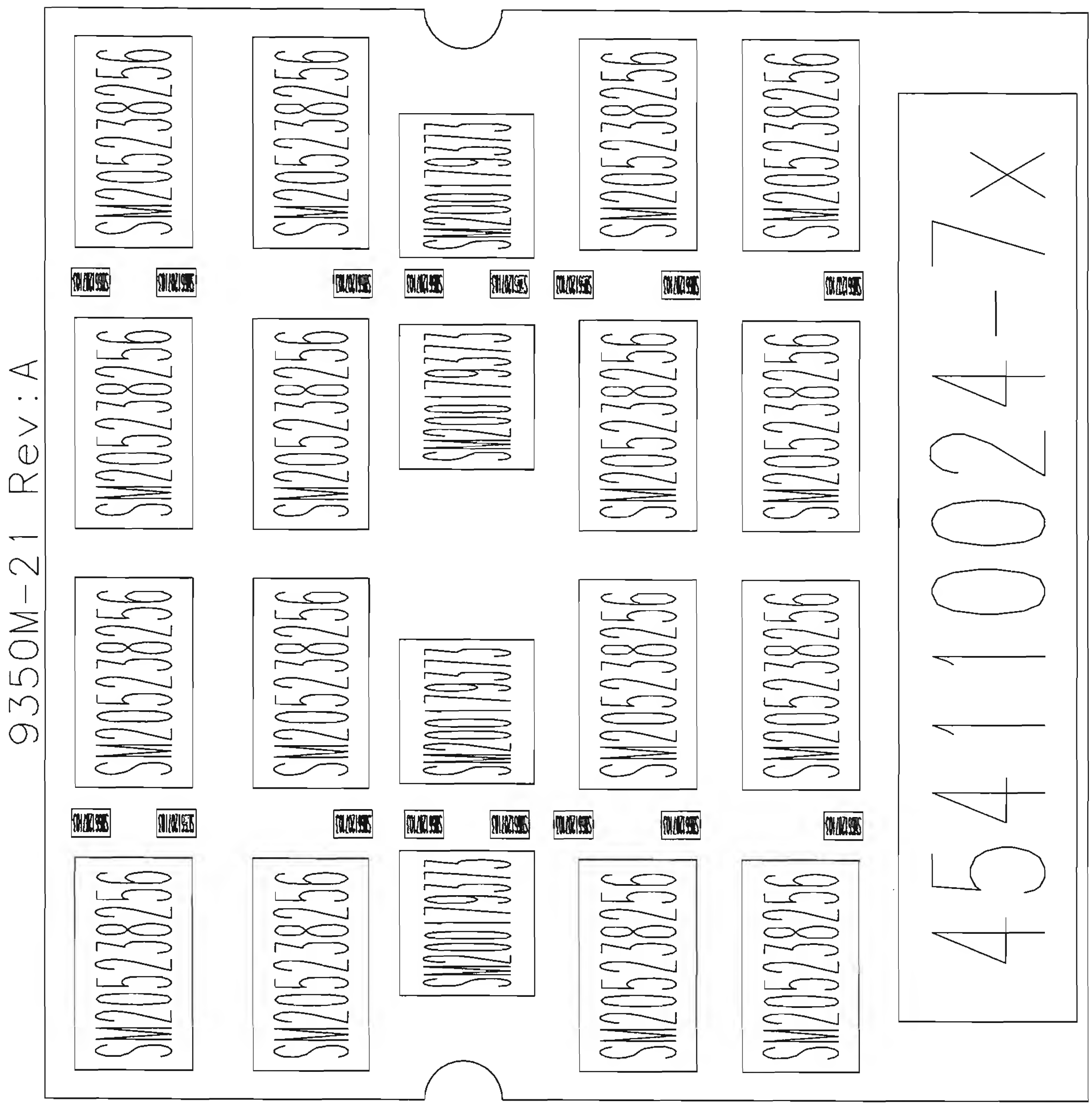
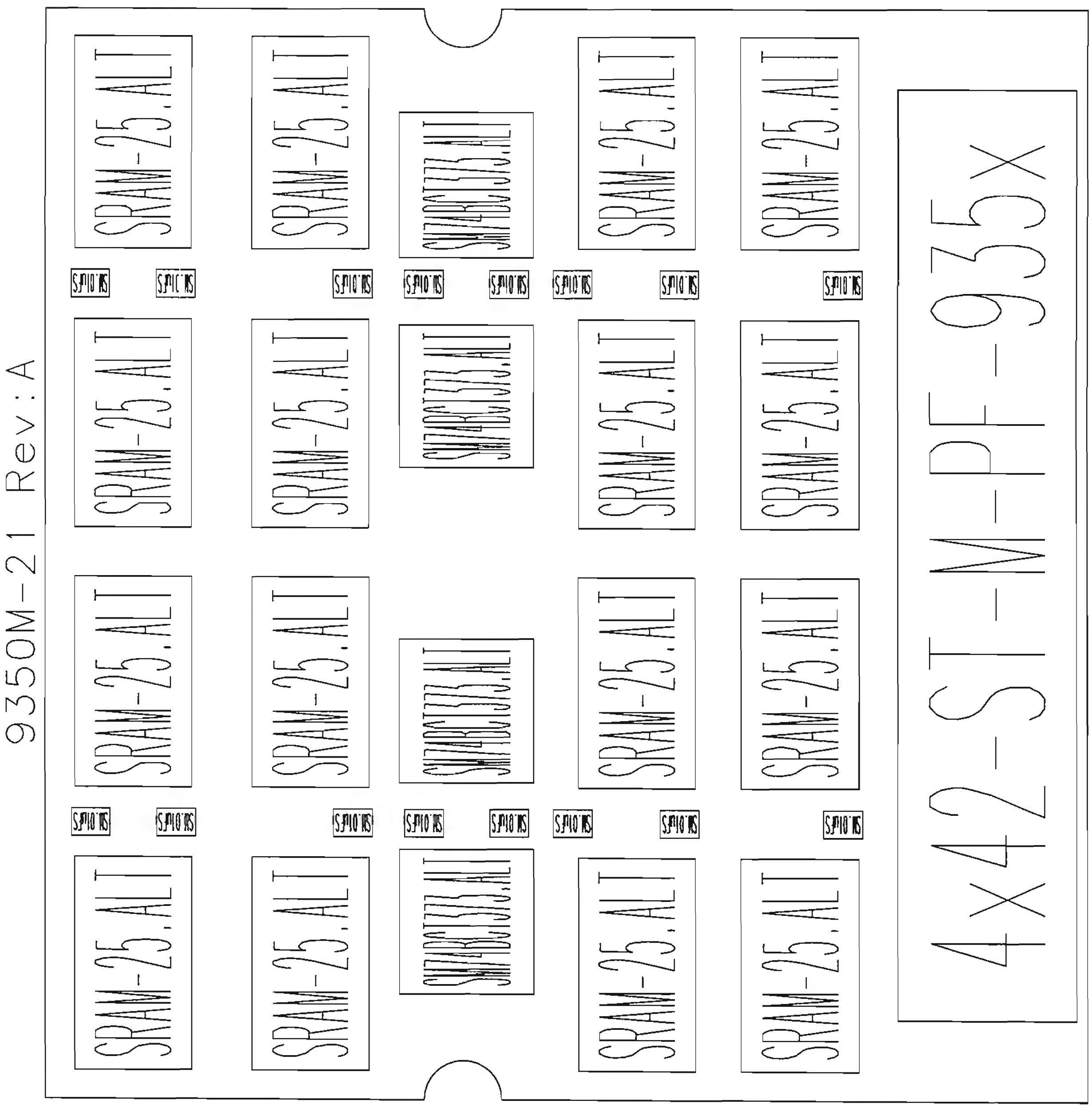
A6
A8
A10
1


9350M-21 Rev:A
45411024-7x


9350M-21 Rev:A
4x42-ST-M-PF-935x
SRAM-25.ALT

PART: F9350-21 DESC: ACQUISITION MEMORY CARD 2x50K for 9354A & 9354T

Location	Part Number	Description	Location	Part Number	Description
A1	SM205228863	SRAM8Kx8-25	A38	SM205228863	SRAM8Kx8-25
A2	SM205228863	SRAM8Kx8-25	A39	SM205228863	SRAM8Kx8-25
A3	SM205228863	SRAM8Kx8-25	A40	SM205228863	SRAM8Kx8-25
A4	SM205228863	SRAM8Kx8-25	C1	SM661207103	SM.01uFS
A5	SM200179373	SM74BCT373	C2	SM661207103	SM.01uFS
A6	SM200179373	SM74BCT373	C3	SM661207103	SM.01uFS
A7	SM205228863	SRAM8Kx8-25	C4	SM661207103	SM.01uFS
A8	SM205228863	SRAM8Kx8-25	C5	SM661207103	SM.01uFS
A9	SM205228863	SRAM8Kx8-25	C6	SM661207103	SM.01uFS
A10	SM205228863	SRAM8Kx8-25	C7	SM661207103	SM.01uFS
A11	SM205228863	SRAM8Kx8-25	C8	SM661207103	SM.01uFS
A12	SM205228863	SRAM8Kx8-25	C9	SM661207103	SM.01uFS
A13	SM205228863	SRAM8Kx8-25	C10	SM661207103	SM.01uFS
A14	SM205228863	SRAM8Kx8-25	C11	SM661207103	SM.01uFS
A15	SM200179373	SM74BCT373	C12	SM661207103	SM.01uFS
A16	SM200179373	SM74BCT373	C13	SM661207103	SM.01uFS
A17	SM205228863	SRAM8Kx8-25	C14	SM661207103	SM.01uFS
A18	SM205228863	SRAM8Kx8-25	C15	SM661207103	SM.01uFS
A19	SM205228863	SRAM8Kx8-25	C16	SM661207103	SM.01uFS
A20	SM205228863	SRAM8Kx8-25	C17	SM661207103	SM.01uFS
A21	SM205228863	SRAM8Kx8-25	C18	SM661207103	SM.01uFS
A22	SM205228863	SRAM8Kx8-25	C19	SM661207103	SM.01uFS
A23	SM205228863	SRAM8Kx8-25	C20	SM661207103	SM.01uFS
A24	SM205228863	SRAM8Kx8-25	C21	SM661207103	SM.01uFS
A25	SM200179373	SM74BCT373	C22	SM661207103	SM.01uFS
A26	SM200179373	SM74BCT373	C23	SM661207103	SM.01uFS
A27	SM205228863	SRAM8Kx8-25	C24	SM661207103	SM.01uFS
A28	SM205228863	SRAM8Kx8-25	C25	SM661207103	SM.01uFS
A29	SM205228863	SRAM8Kx8-25	C26	SM661207103	SM.01uFS
A30	SM205228863	SRAM8Kx8-25	C27	SM661207103	SM.01uFS
A31	SM205228863	SRAM8Kx8-25	C28	SM661207103	SM.01uFS
A32	SM205228863	SRAM8Kx8-25	C29	SM661207103	SM.01uFS
A33	SM205228863	SRAM8Kx8-25	C30	SM661207103	SM.01uFS
A34	SM205228863	SRAM8Kx8-25	C31	SM661207103	SM.01uFS
A35	SM200179373	SM74BCT373	C32	SM661207103	SM.01uFS
A36	SM200179373	SM74BCT373	J1	454110024	7x 4x42
A37	SM205228863	SRAM8Kx8-25			

PART: S9350-21 DESC: ACQUISITION MEMORY CARD 2x50K for 9354A & 9354T

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
145344109	CAP ALU COMPACT AXIAL 10000UF	2
454110024	HDR 2MM PRESSFIT TO MALE 24	7
719350M21	PC BD PREASS'Y 9350M-21	1
SM200179373	IC OCTAL LATCH 74BCT373	8
SM205228863	IC 8K X 8 STATIC RAM 25NS	32
SM661207103	CAP CERA CHIP 20% .01UF (0805)	32

PART: S9350M-21 DESC: ACQUISITION MEMORY CARD 2x250K for 9354AM & 9354MT

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
145344109	CAP ALU COMPACT AXIAL 10000UF	2
454110024	HDR 2MM PRESSFIT TO MALE 24	7
719350M21	PC BD PREASS'Y 9350M-21	1
SM200179373	IC OCTAL LATCH 74BCT373	8
SM205238256	IC 32K X 8 SRAM 25NS	32
SM661207103	CAP CERA CHIP 20% .01UF (0805)	32

PART: F9350L-2 DESC: ACQUISITION MEMORY CARD 2 x 2 M for 9354AL

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
145344109	CAP ALU COMPACT AXIAL 10000UF	2
454110024	HDR 2MM PRESSFIT TO MALE 24	7
719350L23	PC BD PREASS'Y 9350L-2	1
SM200179373	IC OCTAL LATCH 74BCT373	4
SM205232226	IC 128KX8 SRAM 25 6226AWJ25	32
SM207480843	IC 9-BIT BUS INT LA 74BCT29843	4
SM661207103	CAP CERA CHIP 20% .01UF (0805)	32

PART: F9350M-21 DESC: ACQUISITION MEMORY CARD 2x250K for 9354AM & 9354TM

Location	Part Number	Description	Location	Part Number	Description
A1	SM205238256	SRAM-25	A38	SM205238256	SRAM-25
A2	SM205238256	SRAM-25	A39	SM205238256	SRAM-25
A3	SM205238256	SRAM-25	A40	SM205238256	SRAM-25
A4	SM205238256	SRAM-25	C1	SM661207103	SM.01uFS
A5	SM200179373	SM74BCT373	C2	SM661207103	SM.01uFS
A6	SM200179373	SM74BCT373	C3	SM661207103	SM.01uFS
A7	SM205238256	SRAM-25	C4	SM661207103	SM.01uFS
A8	SM205238256	SRAM-25	C5	SM661207103	SM.01uFS
A9	SM205238256	SRAM-25	C6	SM661207103	SM.01uFS
A10	SM205238256	SRAM-25	C7	SM661207103	SM.01uFS
A11	SM205238256	SRAM-25	C8	SM661207103	SM.01uFS
A12	SM205238256	SRAM-25	C9	SM661207103	SM.01uFS
A13	SM205238256	SRAM-25	C10	SM661207103	SM.01uFS
A14	SM205238256	SRAM-25	C11	SM661207103	SM.01uFS
A15	SM200179373	SM74BCT373	C12	SM661207103	SM.01uFS
A16	SM200179373	SM74BCT373	C13	SM661207103	SM.01uFS
A17	SM205238256	SRAM-25	C14	SM661207103	SM.01uFS
A18	SM205238256	SRAM-25	C15	SM661207103	SM.01uFS
A19	SM205238256	SRAM-25	C16	SM661207103	SM.01uFS
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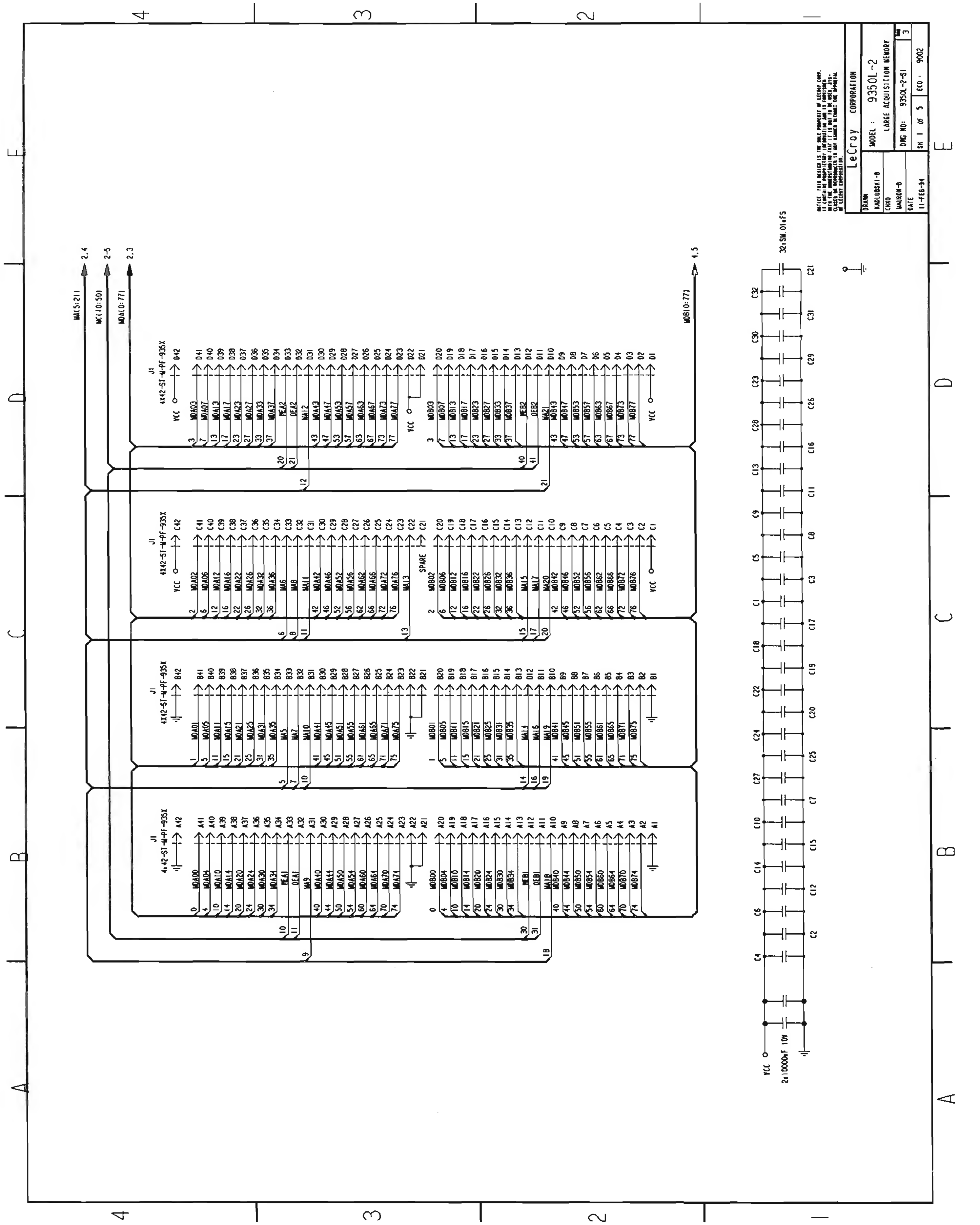
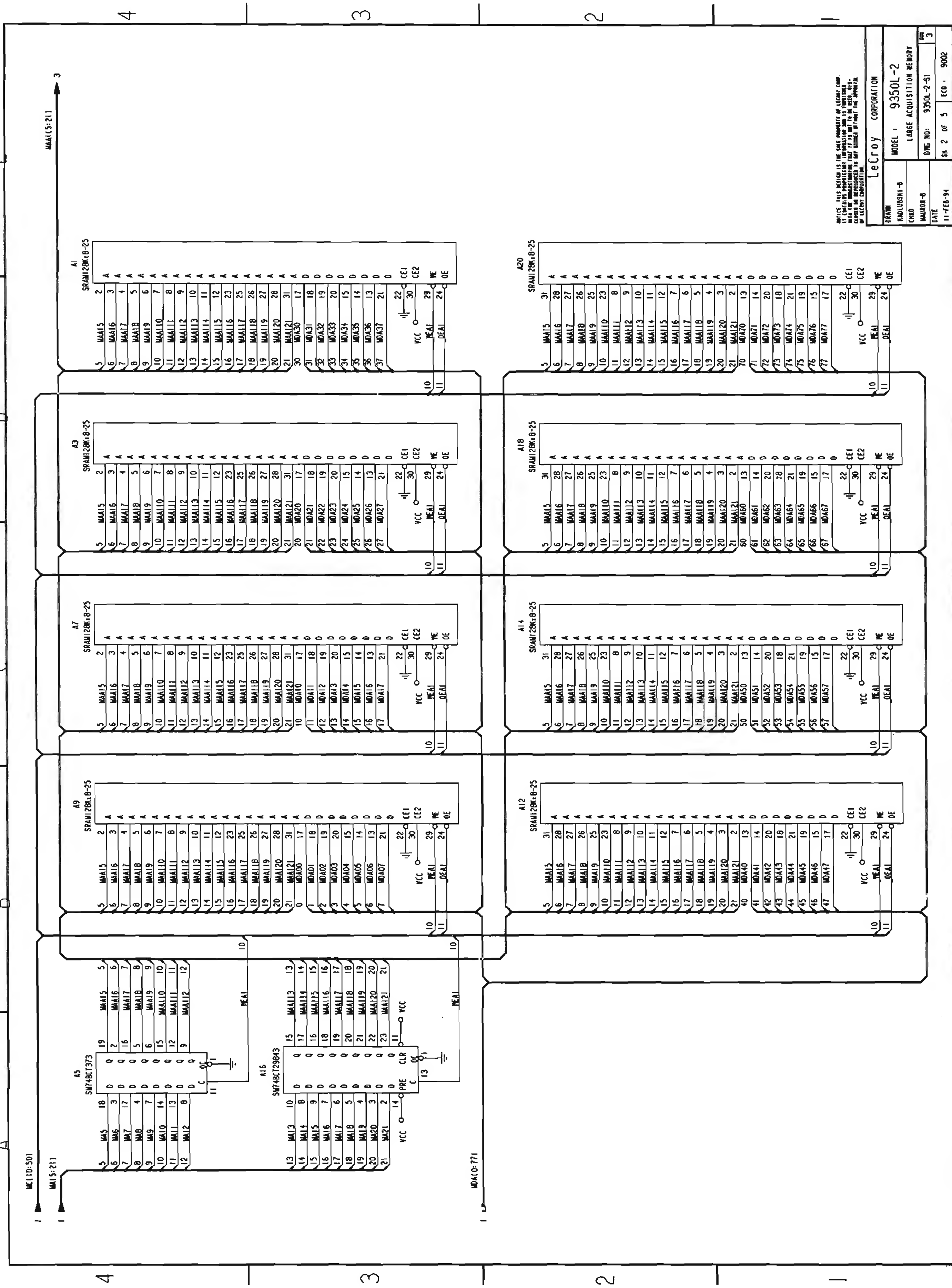
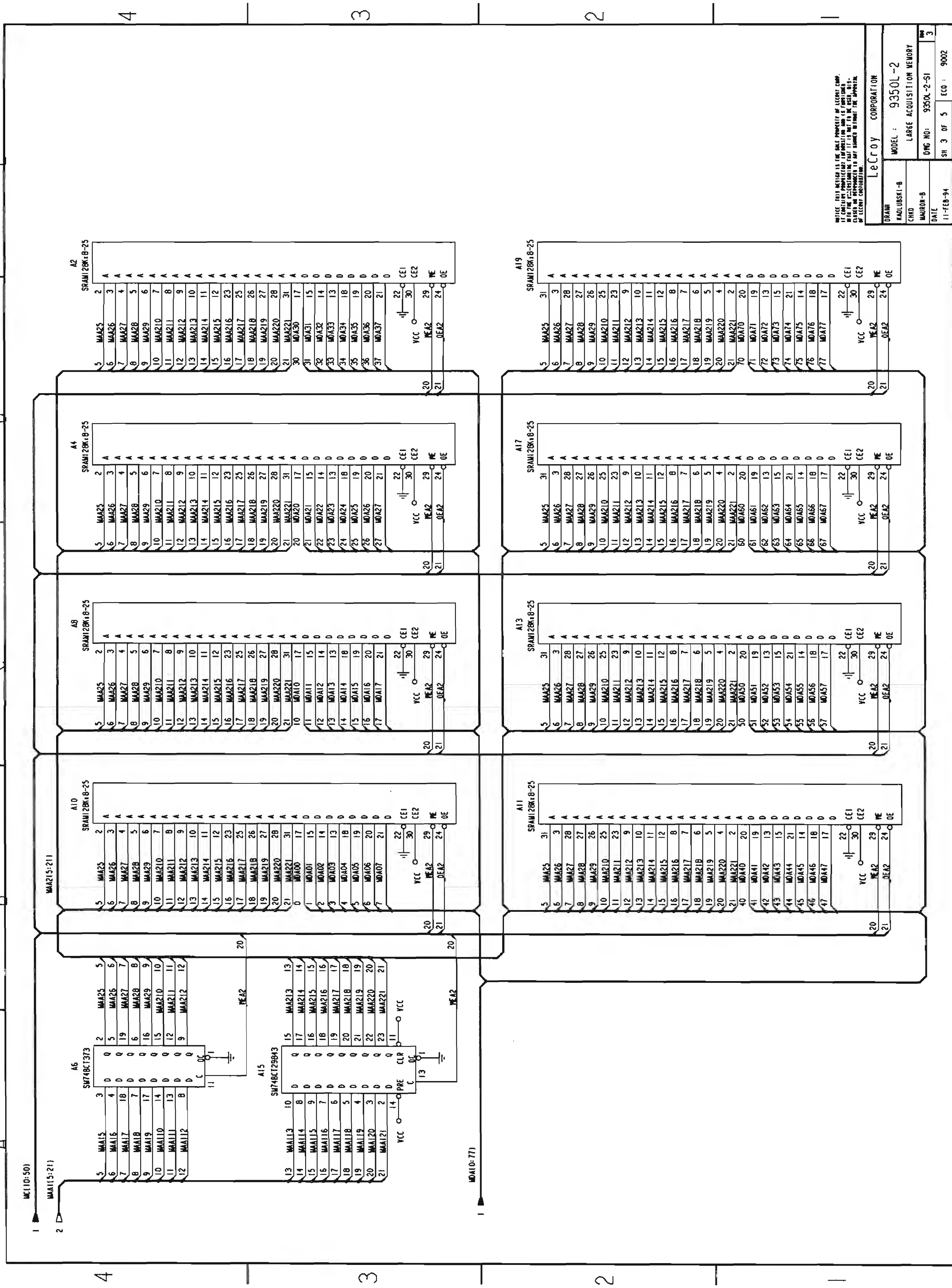
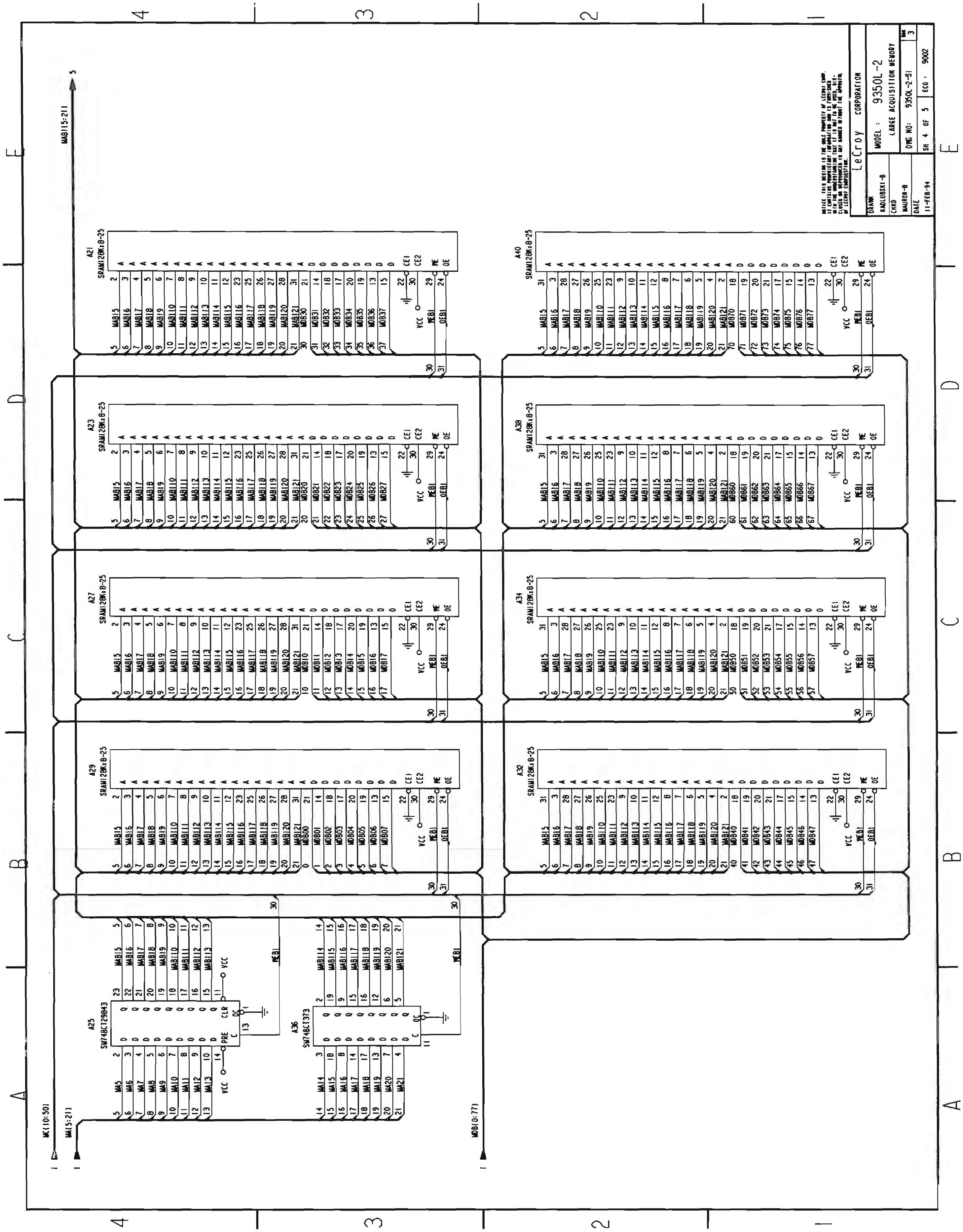
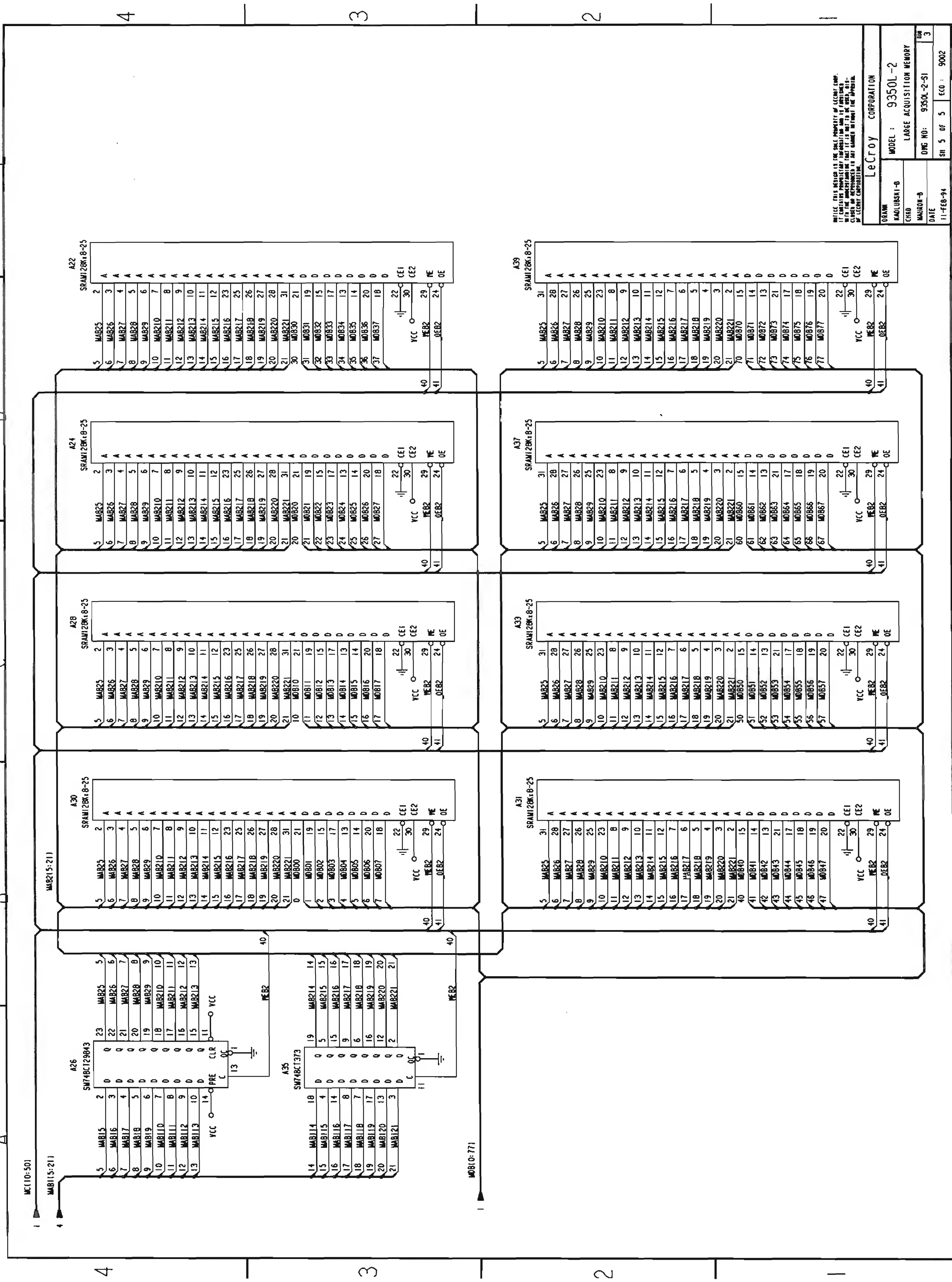
A21	SM205238256	SRAM-25	C18	SM661207103	SM.01uFS
A22	SM205238256	SRAM-25	C19	SM661207103	SM.01uFS
A23	SM205238256	SRAM-25	C20	SM661207103	SM.01uFS
A24	SM205238256	SRAM-25	C21	SM661207103	SM.01uFS
A25	SM200179373	SM74BCT373	C22	SM661207103	SM.01uFS
A26	SM200179373	SM74BCT373	C23	SM661207103	SM.01uFS
A27	SM205238256	SRAM-25	C24	SM661207103	SM.01uFS
A28	SM205238256	SRAM-25	C25	SM661207103	SM.01uFS
A29	SM205238256	SRAM-25	C26	SM661207103	SM.01uFS
A30	SM205238256	SRAM-25	C27	SM661207103	SM.01uFS
A31	SM205238256	SRAM-25	C28	SM661207103	SM.01uFS
A32	SM205238256	SRAM-25	C29	SM661207103	SM.01uFS
A33	SM205238256	SRAM-25	C30	SM661207103	SM.01uFS
A34	SM205238256	SRAM-25	C31	SM661207103	SM.01uFS
A35	SM200179373	SM74BCT373	C32	SM661207103	SM.01uFS
A36	SM200179373	SM74BCT373	J1	454110024	7x 4x42-ST-M
A37	SM205238256	SRAM-25			

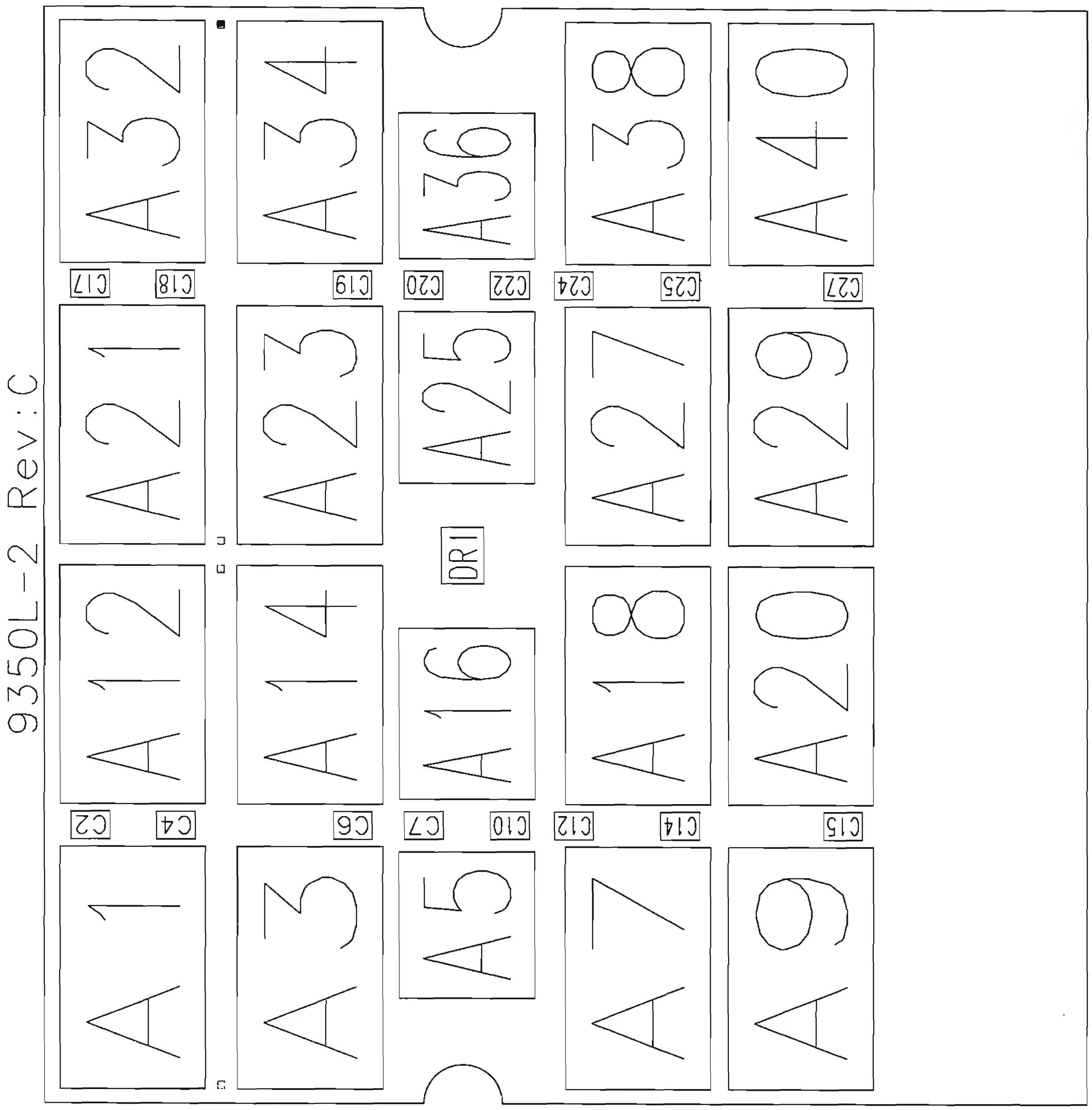

LeCroy CORPORATION
9350L-2
LARGE ACQUISITION MEMORY


LeCroy CORPORATION
MODEL : 9350L-2
LARGE ACQUISITION MEMORY
DWG NO: 9350L-2-31
SH 2 OF 5
ECO : 9002
11-FEB-94
SRAM128Kx8-25
SN74BCT373
SN74BCT29843


LeCroy CORPORATION
MODEL : 9350L-2
LARGE ACQUISITION MEMORY
DWG NO: 9350L-2-S1
SH 3 OF 5
ECO : 9002
DRAWN KADLUBSKI-B
CHKD MAURON-B
DATE 11-FEB-94


LeCroy CORPORATION
MODEL : 9350L-2
LARGE ACQUISITION MEMORY


LeCroy CORPORATION
MODEL : 9350L-2
LARGE ACQUISITION MEMORY
DWG NO: 9350L-2-S1
SH 5 OF 5
ECO : 9002
DRAWN KADLUBSKI-B
MAURON-B
DATE 11-FEB-94


9350L-2 Rev:C
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A36
A38
A40
DR1
C2
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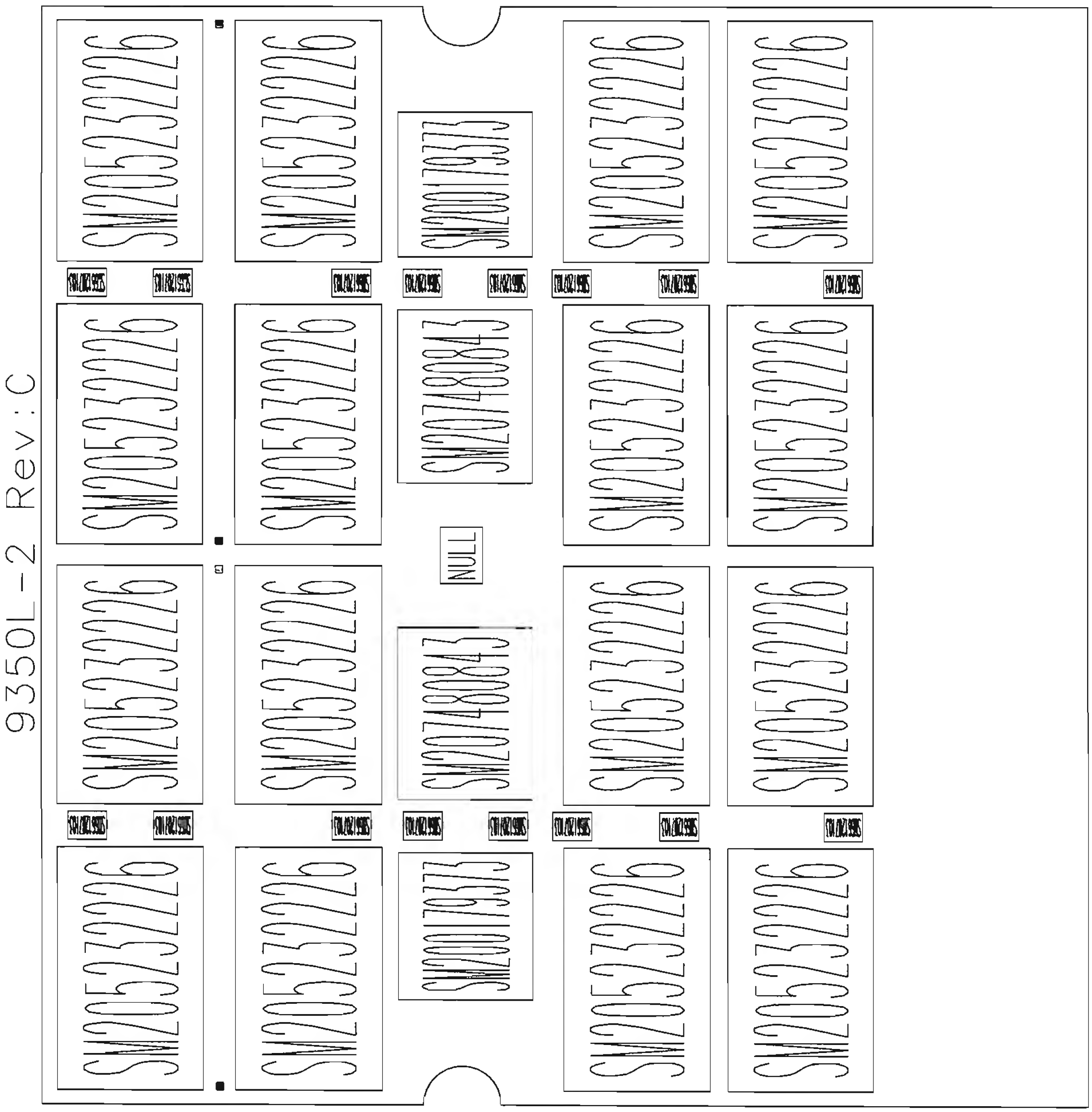
9350L-2 Rev:C
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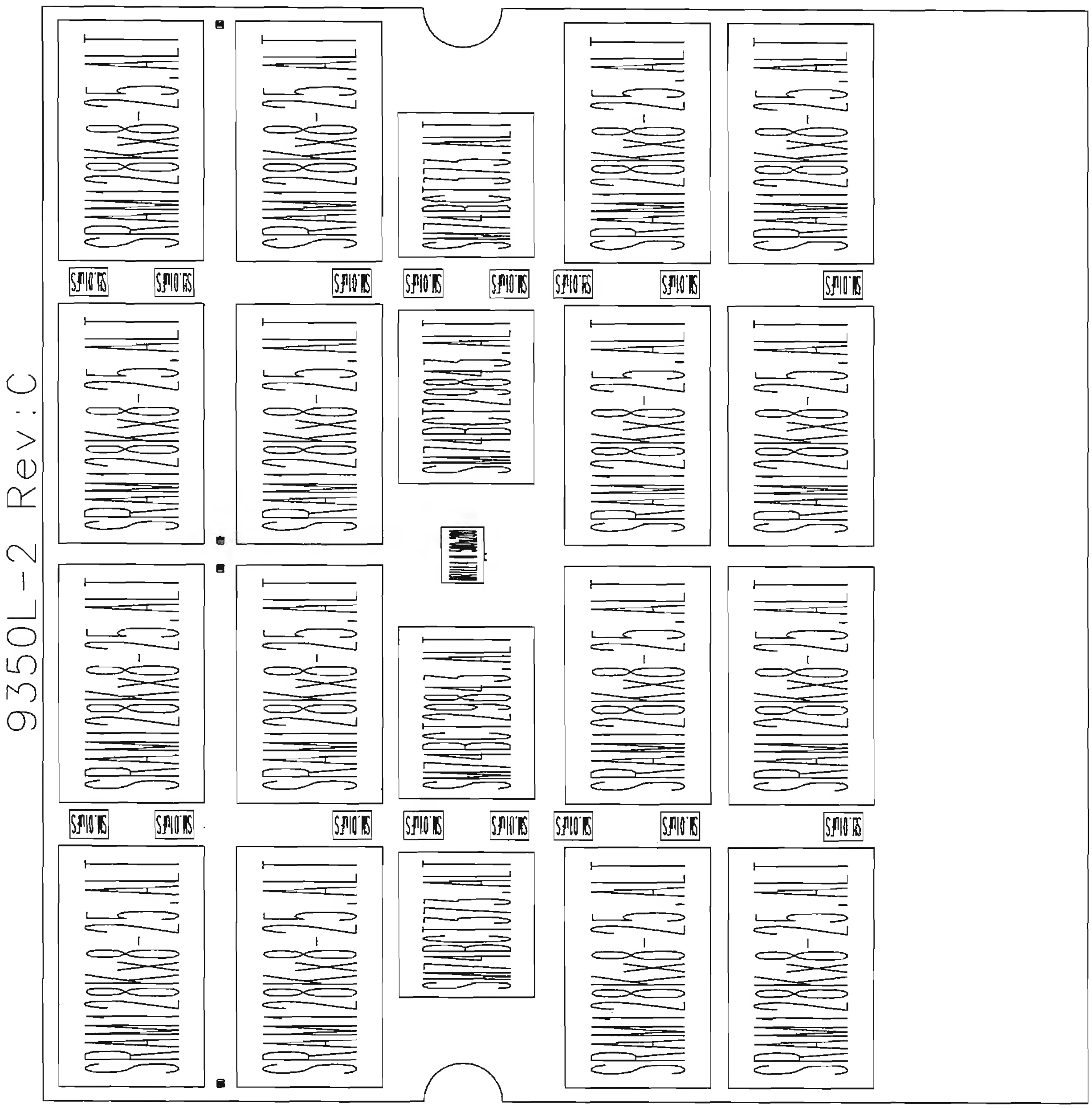
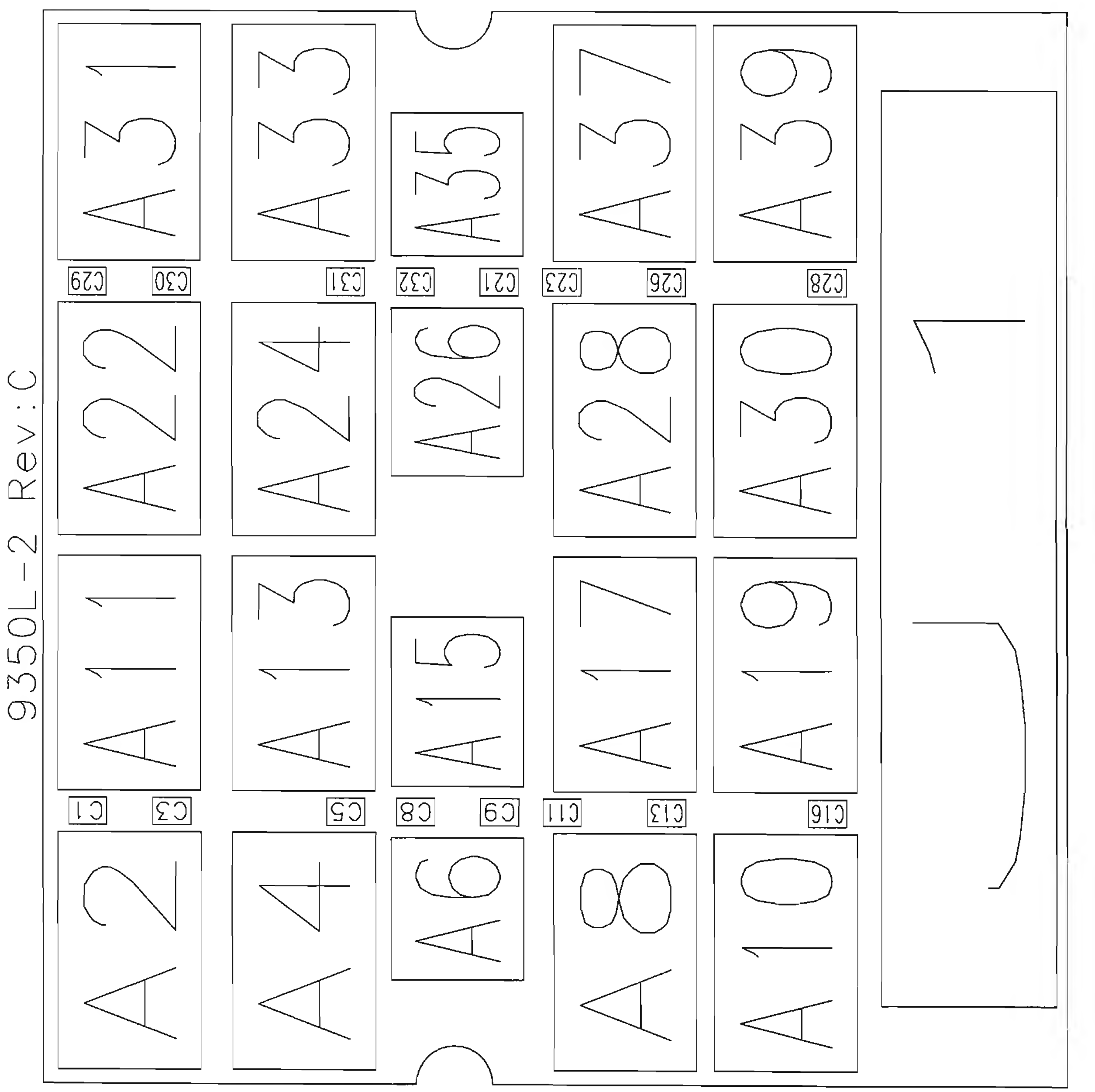

9350L-2 Rev:C


9350L-2 Rev:C
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C29
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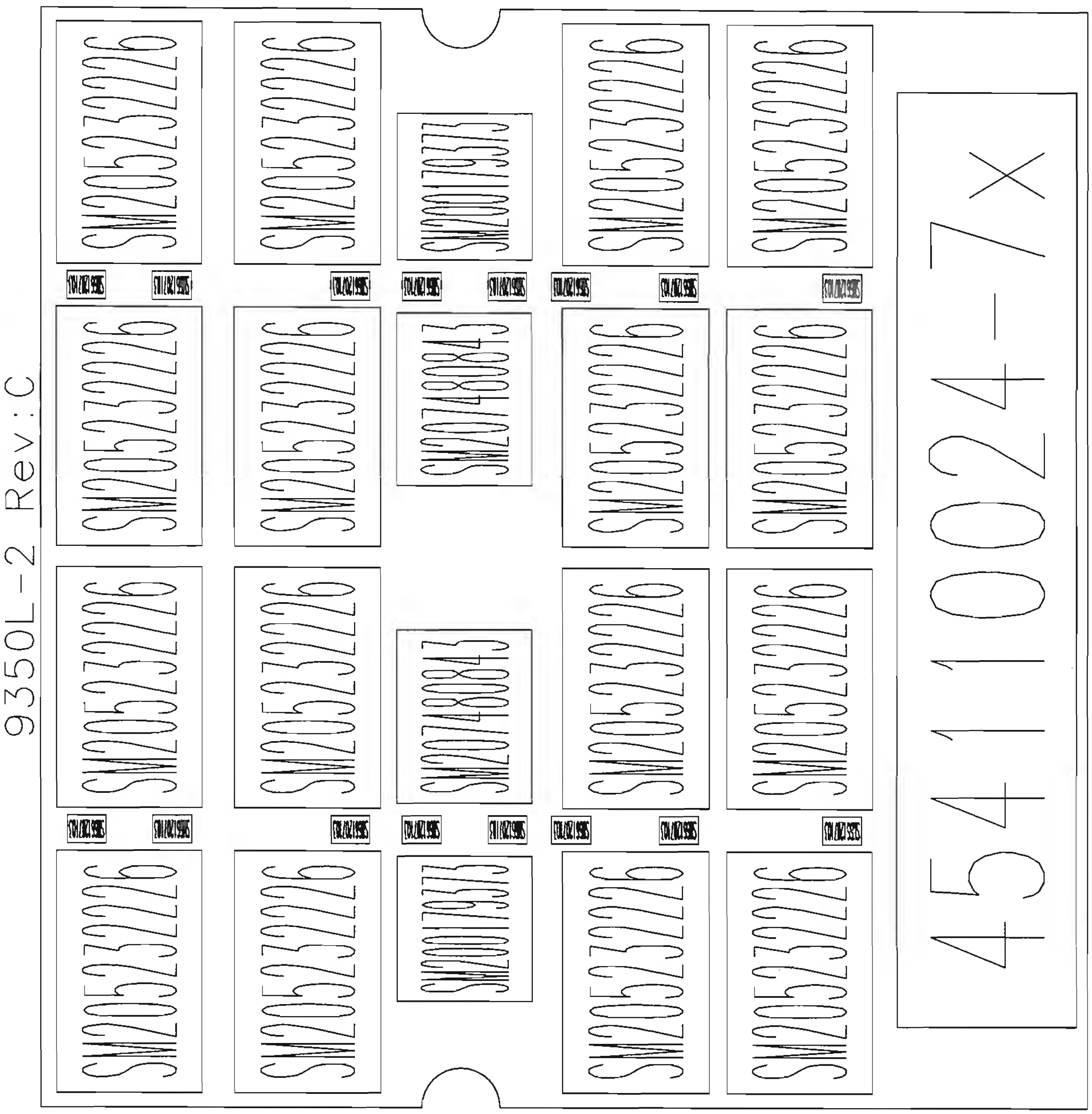
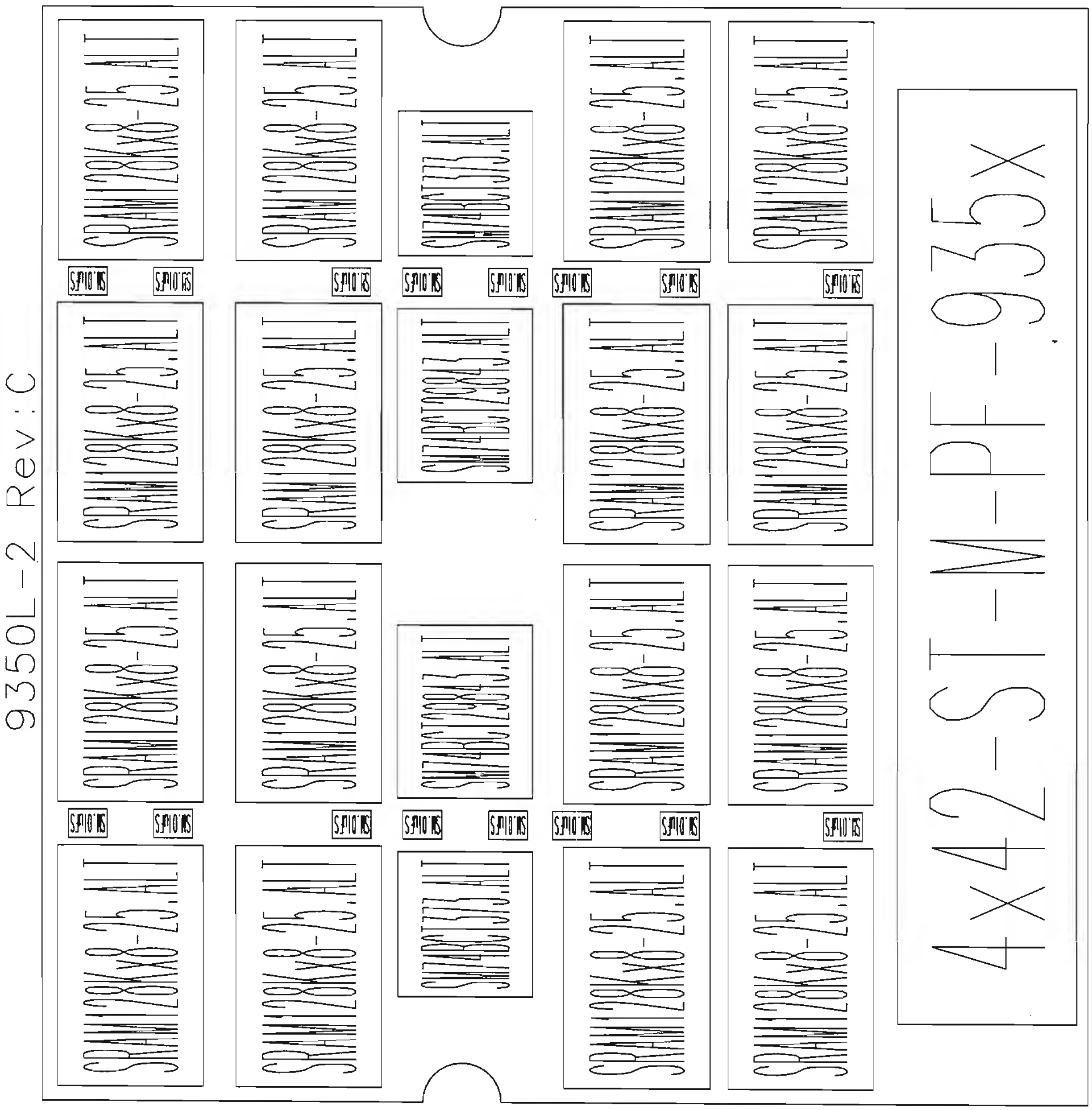
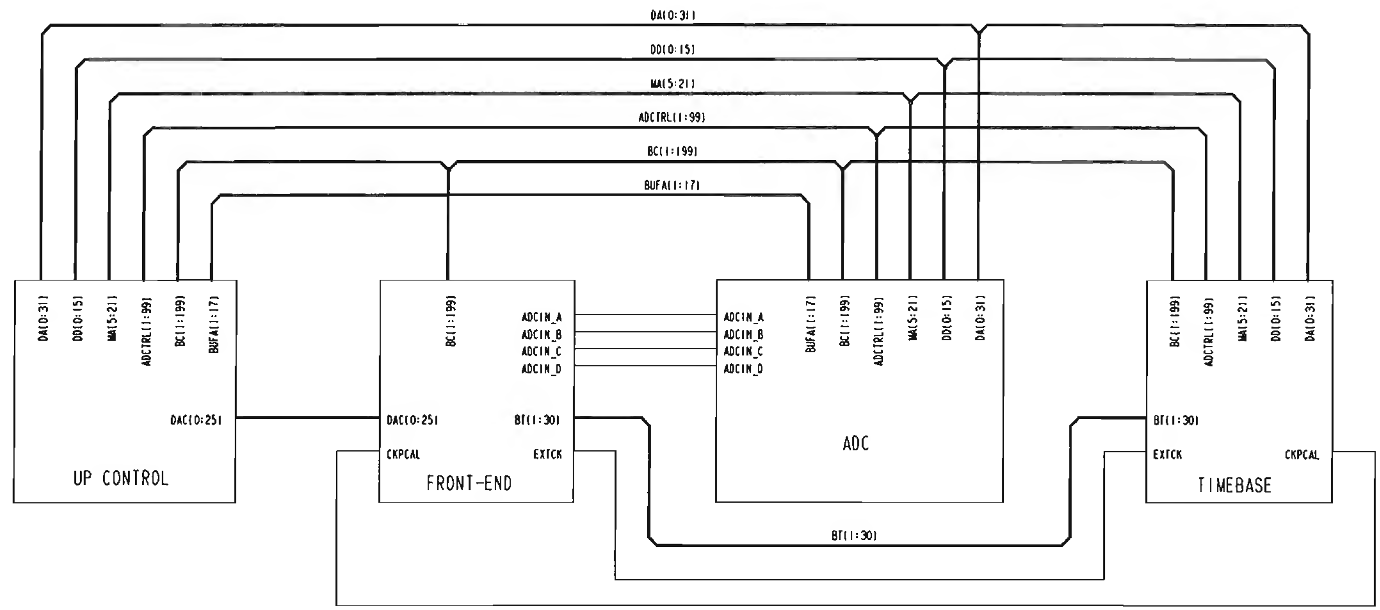

9350L-2 Rev:C
454110024-7x


9350L-2 Rev:C
4x42-ST-M-PF-935x

PART: F9350L-2 DESC: ACQUISITION MEMORY CARD 2x2 M for 9354AL

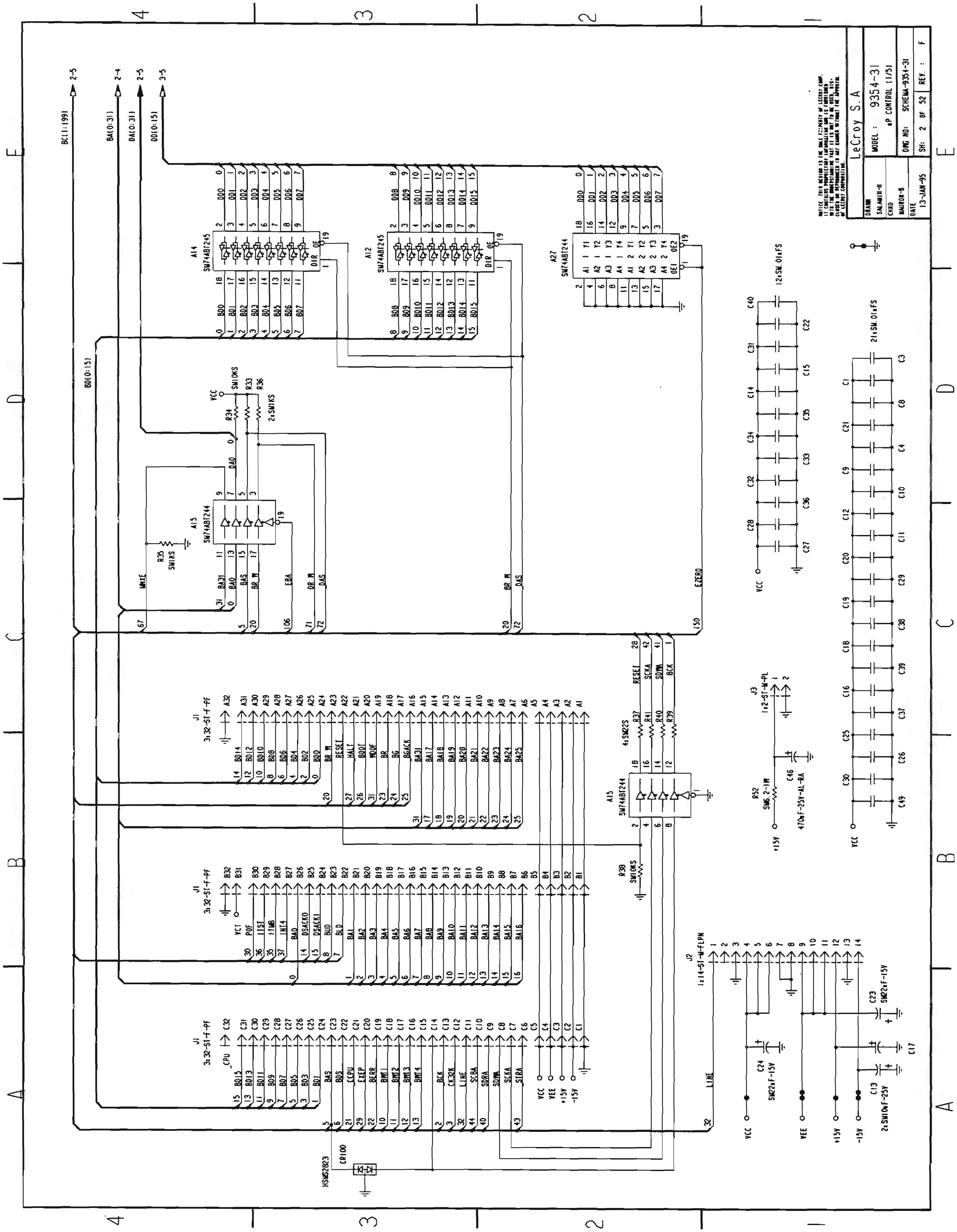
Location	Part Number	Description	Location	Part Number	Description
A1	SM205232226	SRAM128Kx8-25	A38	SM205232226	SRAM128Kx8-25
A2	SM205232226	SRAM128Kx8-25	A39	SM205232226	SRAM128Kx8-25
A3	SM205232226	SRAM128Kx8-25	A40	SM205232226	SRAM128Kx8-25
A4	SM205232226	SRAM128Kx8-25	C1	SM661207103	SM.01uFS
A5	SM200179373	SM74BCT373	C2	SM661207103	SM.01uFS
A6	SM200179373	SM74BCT373	C3	SM661207103	SM.01uFS
A7	SM205232226	SRAM128Kx8-25	C4	SM661207103	SM.01uFS
A8	SM205232226	SRAM128Kx8-25	C5	SM661207103	SM.01uFS
A9	SM205232226	SRAM128Kx8-25	C6	SM661207103	SM.01uFS
A10	SM205232226	SRAM128Kx8-25	C7	SM661207103	SM.01uFS
A11	SM205232226	SRAM128Kx8-25	C8	SM661207103	SM.01uFS
A12	SM205232226	SRAM128Kx8-25	C9	SM661207103	SM.01uFS
A13	SM205232226	SRAM128Kx8-25	C10	SM661207103	SM.01uFS
A14	SM205232226	SRAM128Kx8-25	C11	SM661207103	SM.01uFS
A15	SM207480843	SM74BCT29843	C12	SM661207103	SM.01uFS
A16	SM207480843	SM74BCT29843	C13	SM661207103	SM.01uFS
A17	SM205232226	SRAM128Kx8-25	C14	SM661207103	SM.01uFS
A18	SM205232226	SRAM128Kx8-25	C15	SM661207103	SM.01uFS
A19	SM205232226	SRAM128Kx8-25	C16	SM661207103	SM.01uFS
A20	SM205232226	SRAM128Kx8-25	C17	SM661207103	SM.01uFS
A21	SM205232226	SRAM128Kx8-25	C18	SM661207103	SM.01uFS
A22	SM205232226	SRAM128Kx8-25	C19	SM661207103	SM.01uFS
A23	SM205232226	SRAM128Kx8-25	C20	SM661207103	SM.01uFS
A24	SM205232226	SRAM128Kx8-25	C21	SM661207103	SM.01uFS
A25	SM207480843	SM74BCT29843	C22	SM661207103	SM.01uFS
A26	SM207480843	SM74BCT29843	C23	SM661207103	SM.01uFS
A27	SM205232226	SRAM128Kx8-25	C24	SM661207103	SM.01uFS
A28	SM205232226	SRAM128Kx8-25	C25	SM661207103	SM.01uFS
A29	SM205232226	SRAM128Kx8-25	C26	SM661207103	SM.01uFS
A30	SM205232226	SRAM128Kx8-25	C27	SM661207103	SM.01uFS
A31	SM205232226	SRAM128Kx8-25	C28	SM661207103	SM.01uFS
A32	SM205232226	SRAM128Kx8-25	C29	SM661207103	SM.01uFS
A33	SM205232226	SRAM128Kx8-25	C30	SM661207103	SM.01uFS
A34	SM205232226	SRAM128Kx8-25	C31	SM661207103	SM.01uFS
A35	SM200179373	SM74BCT373	C32	SM661207103	SM.01uFS
A36	SM200179373	SM74BCT373	J1	454110024	7x 4x42-ST-M-
A37	SM205232226	SRAM128Kx8-25			

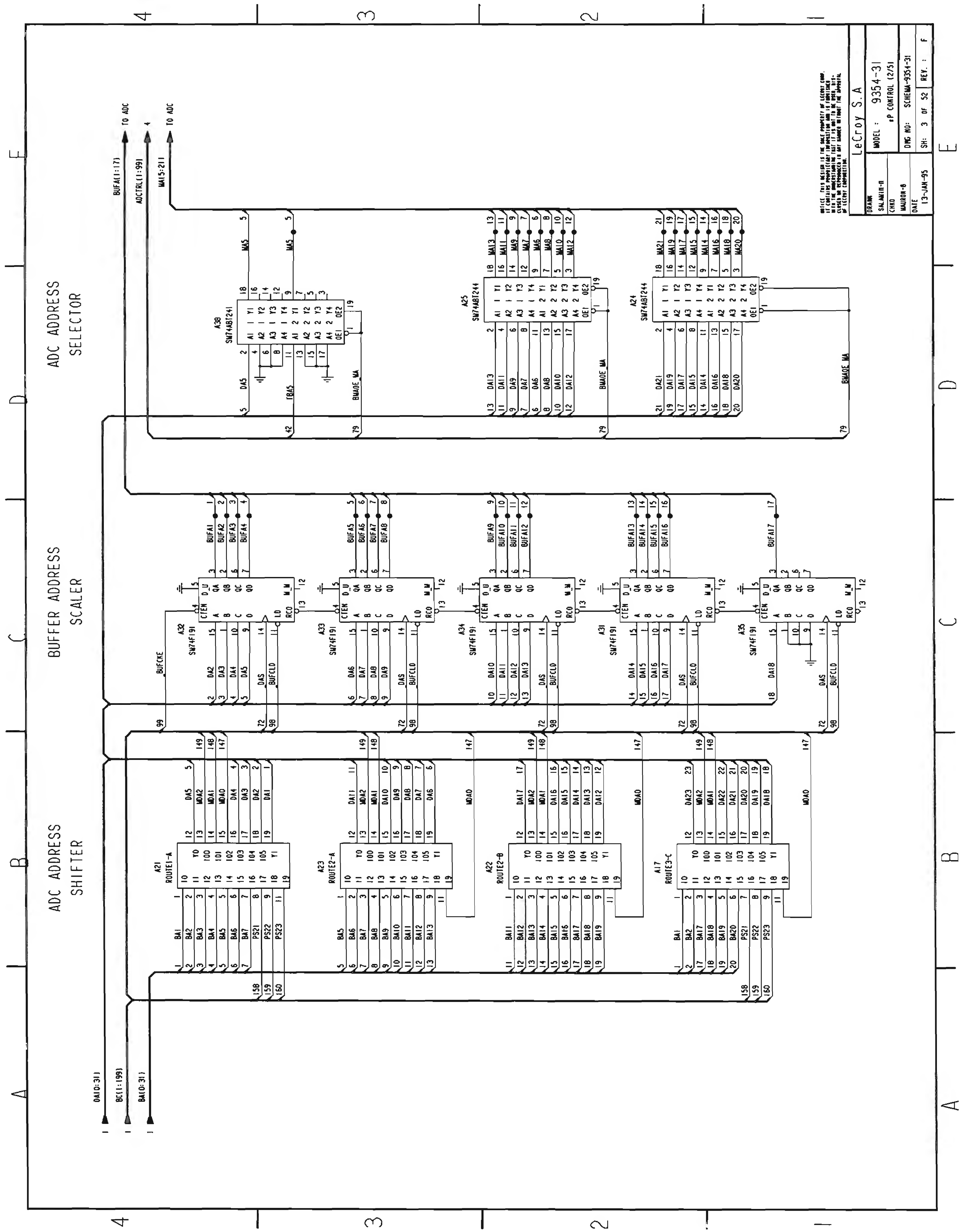


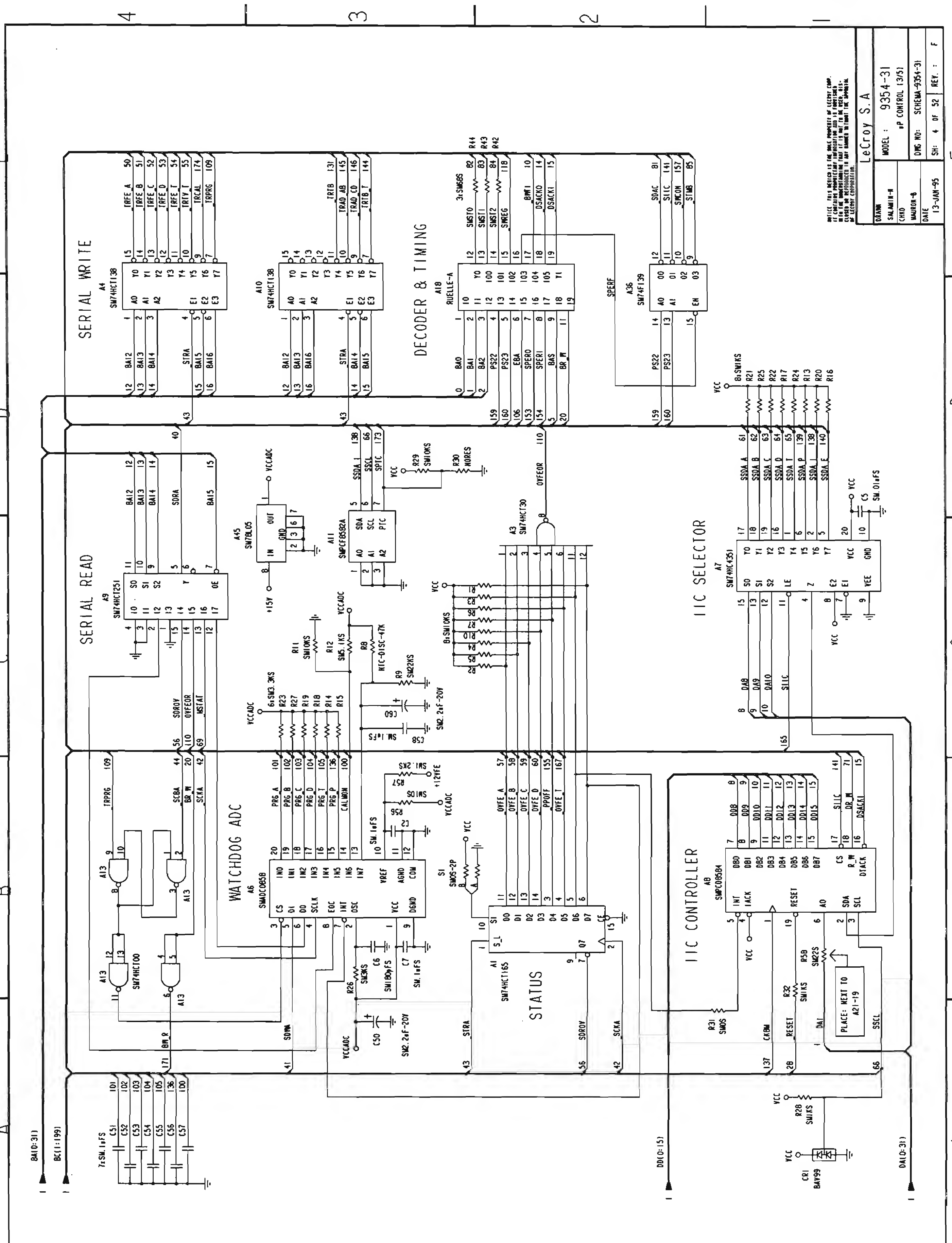
UNMOUNTED COMPONENT FOR 9350-31:

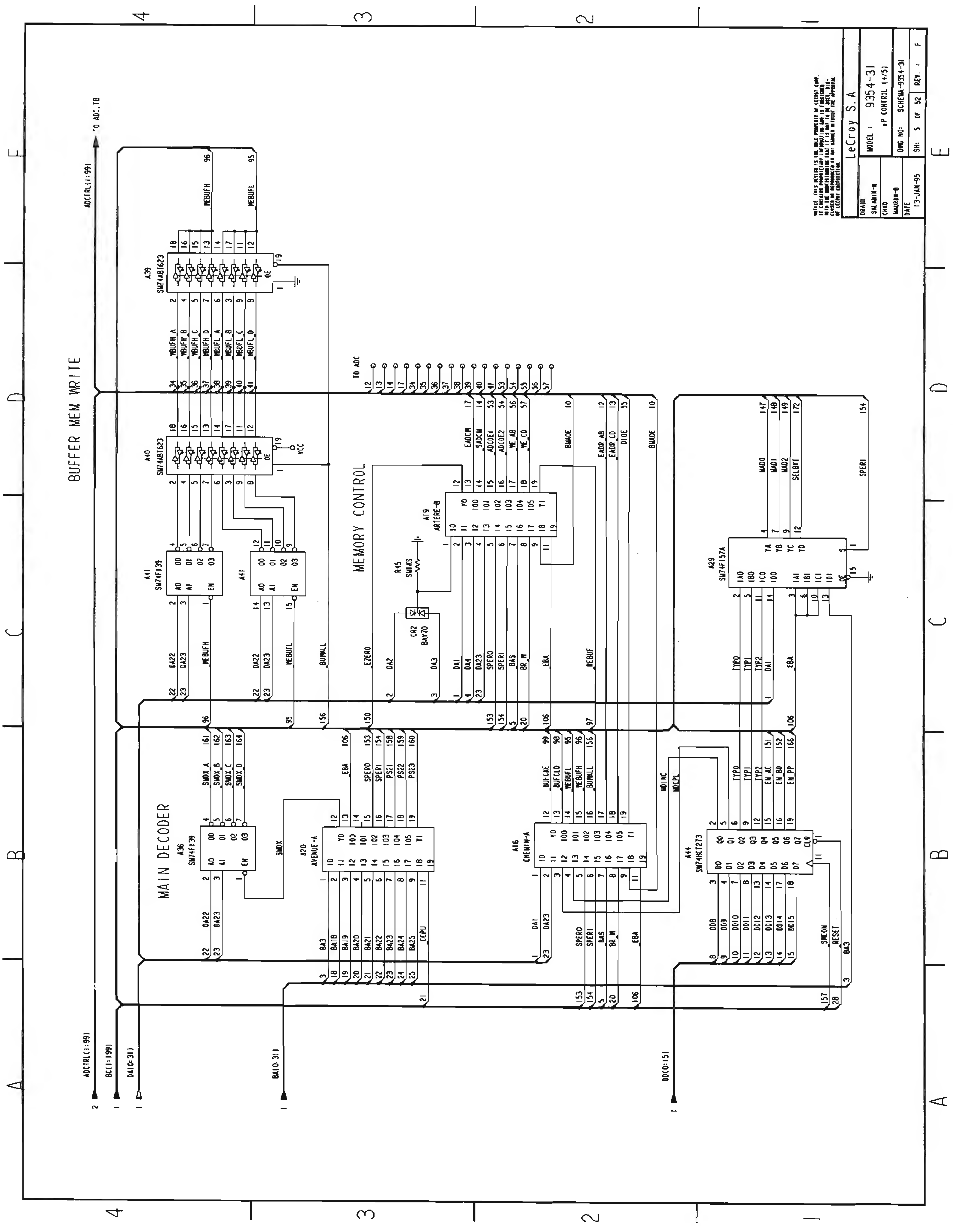
FRONT-END (SHEET7):	- FRONT-END CHANNEL A & B - A214, A215, C232, C233, C237, - C238, R225, R226, R227, R231, - R233, R234, RL200
FRONT-END TRIGGER (SHEET23):	- A5014, A5017, C5051, C5052, - C5057, C5059, C5064, C5065, - C5067, C5068, C5071, C5076, - C5077, C5079, C5084, C5085, - C5087, C5091, C5093, C5094, - CR5006, CR5009, R5071, R5073, - R5075, R5077, R5078, R5081, - R5082, (R5083), R5084, (R5085), - R5086, R5087, R5095, R5097, - R5099, R5103, R5107, R5108, - R5112, R5113, (R5114), R5115, - (R5116), R5117
(R5xxx) = NORES	
FRONT-END TRIGGER (SHEET25):	- C5036, Q5004, R5043, R5047
ADC (SHEET27):	- ADC CONTROL CHANNEL A & B - ADC CONNECTOR CHANNEL A & B

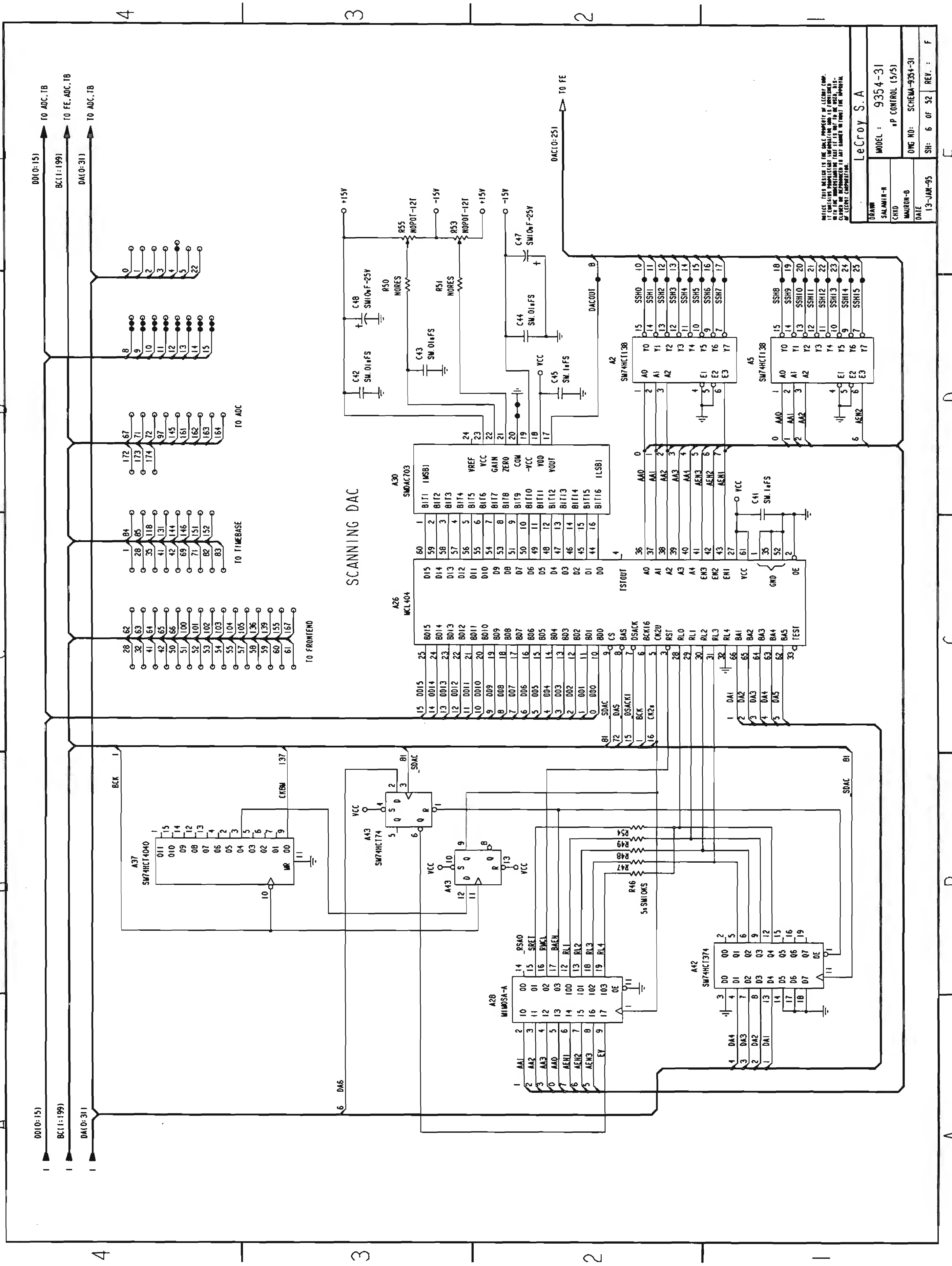
LeCroy S.A	
DRAWN: SALAMIN-N	MODEL: 9354-31 TOP LEVEL (1/1)
CHKD: LEHMANN-JL	DWG NO: SCHEMA-9354-31
DATE: 13-JAN-95	SH: 1 OF 52 REV.: F

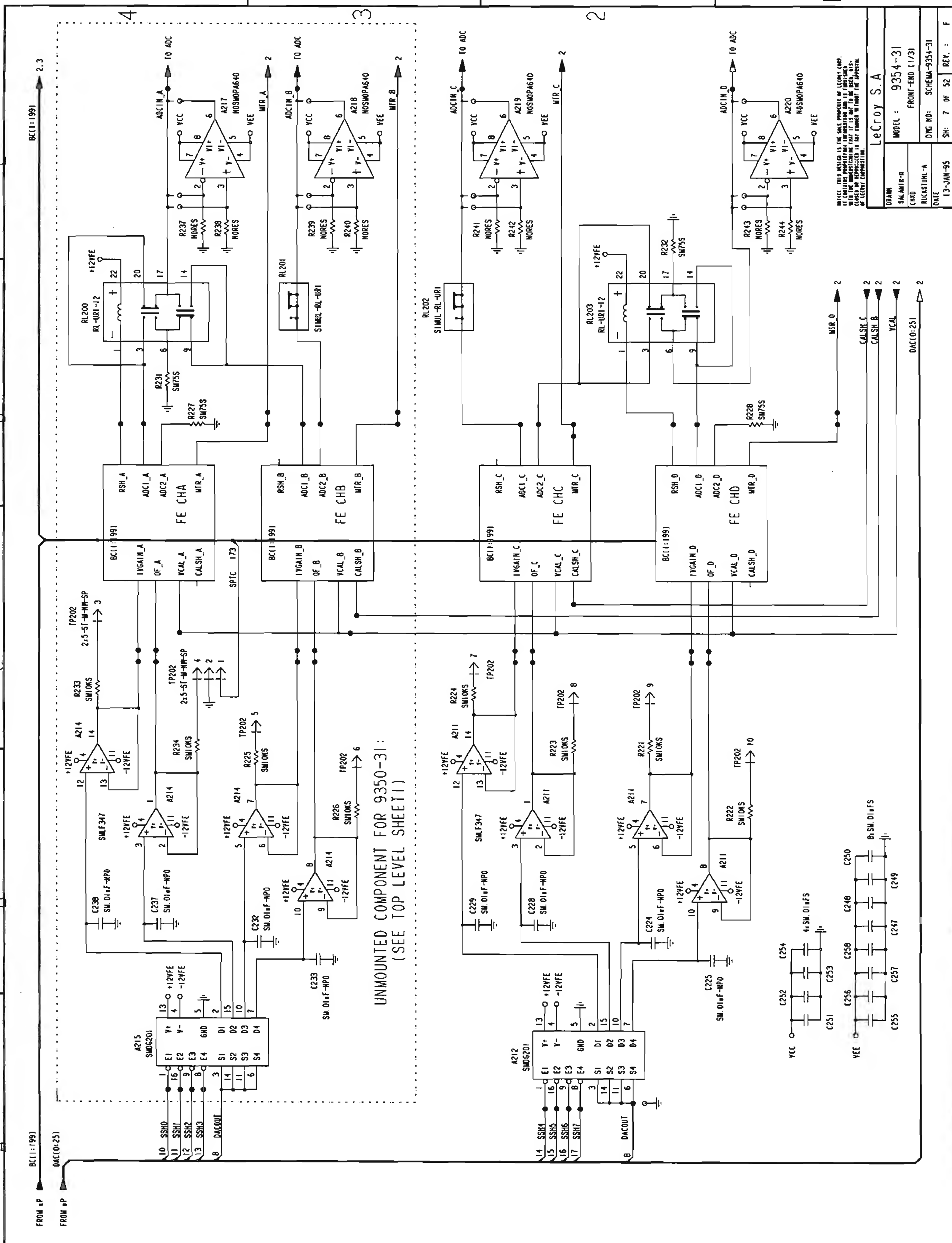

LeCroy S.A
MODEL : 9354-31
µP CONTROL (1/5)
DWG NO: SCHEMA-9354-31
SH: 2 OF 52
REV. : F
DRAWN SALAMIN-H
CHKD MAURON-B
DATE 13-JAN-95

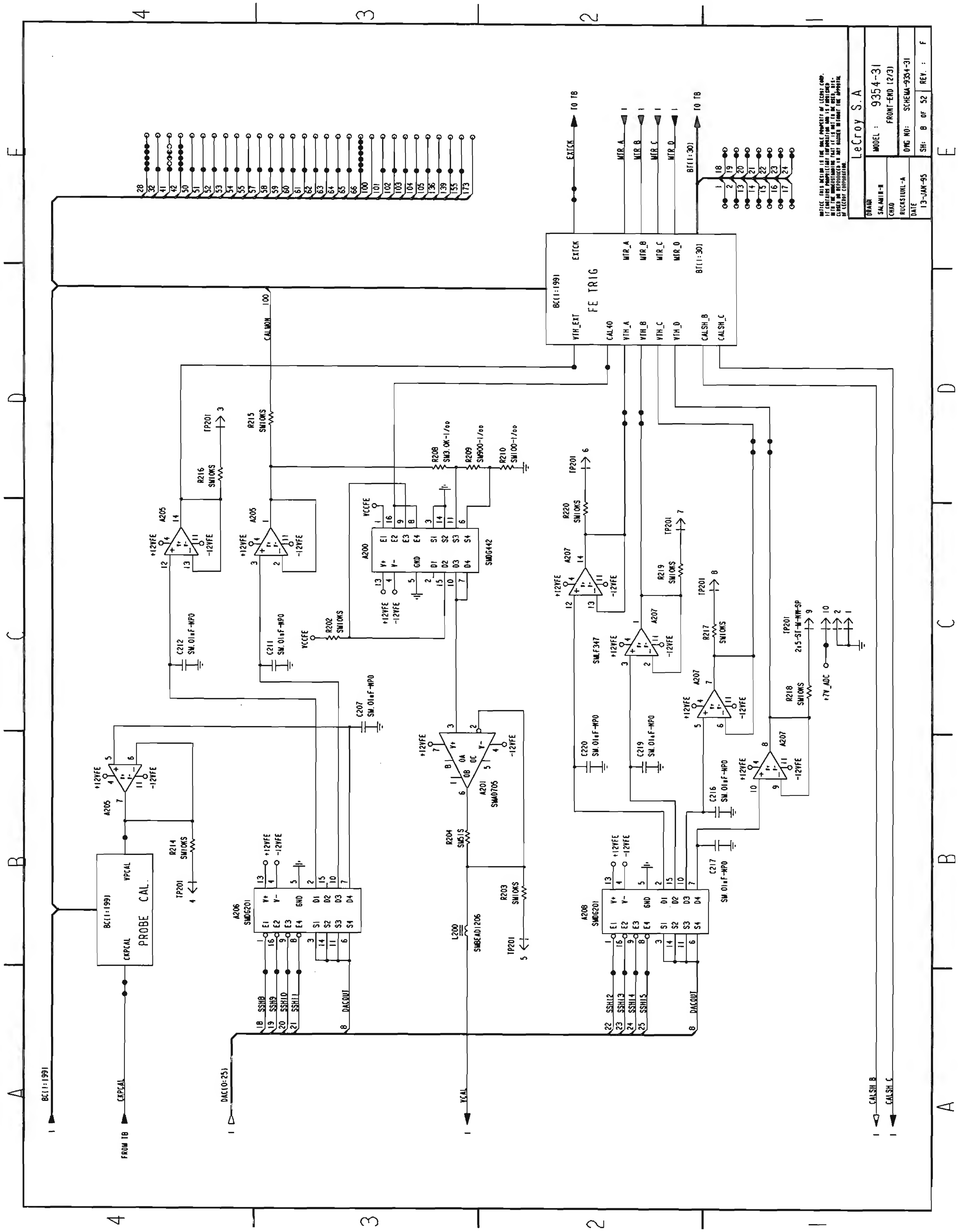

ADC ADDRESS SELECTOR
BUFFER ADDRESS SCALER
ADC ADDRESS SHIFTER
LeCroy S.A
MODEL : 9354-31
DWG NO: SCHEMA-9354-31
13-JAN-95

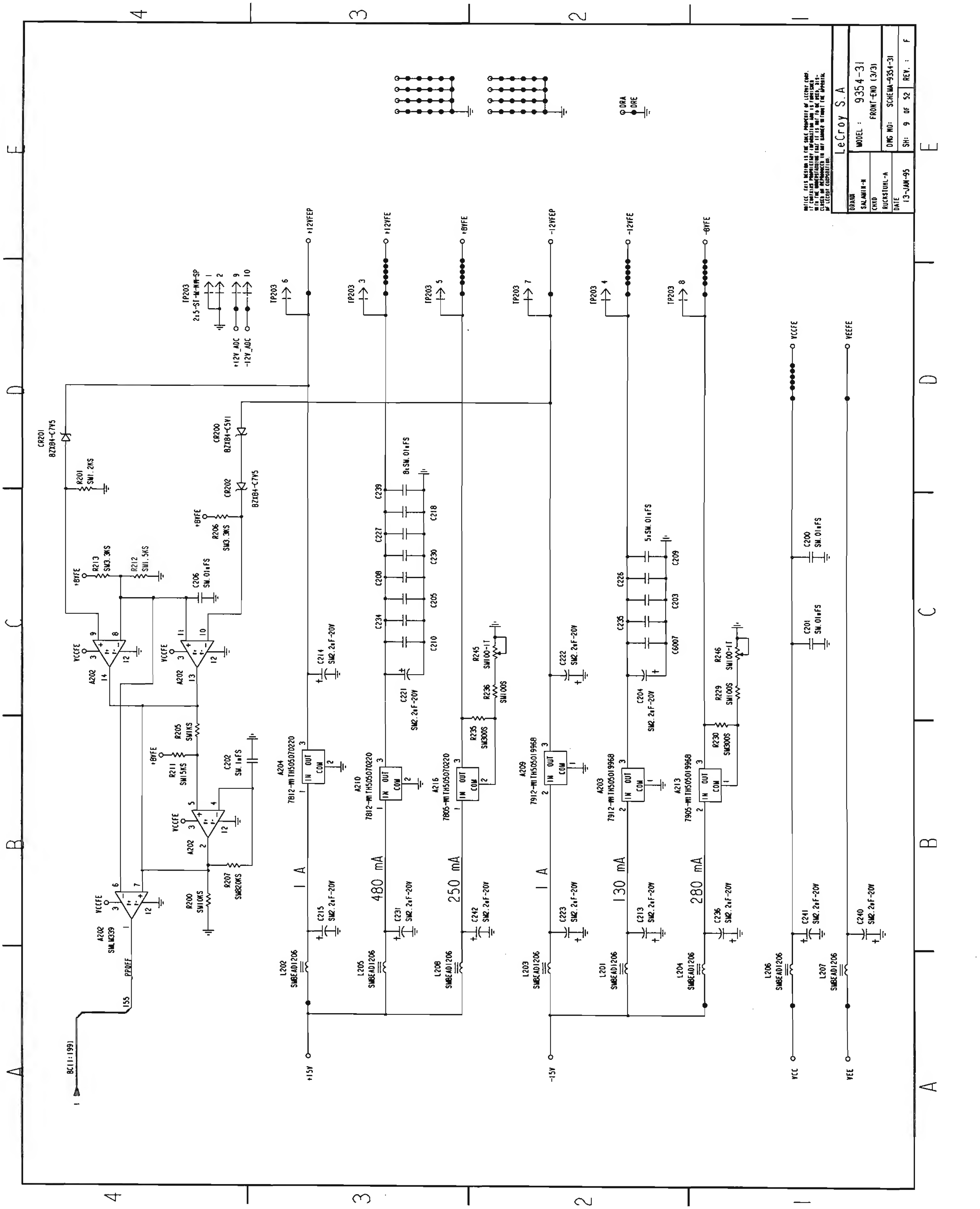

SERIAL WRITE
DECODER & TIMING
SERIAL READ
WATCHDOG ADC
STATUS
IIC SELECTOR
IIC CONTROLLER
LeCroy S.A
9354-31

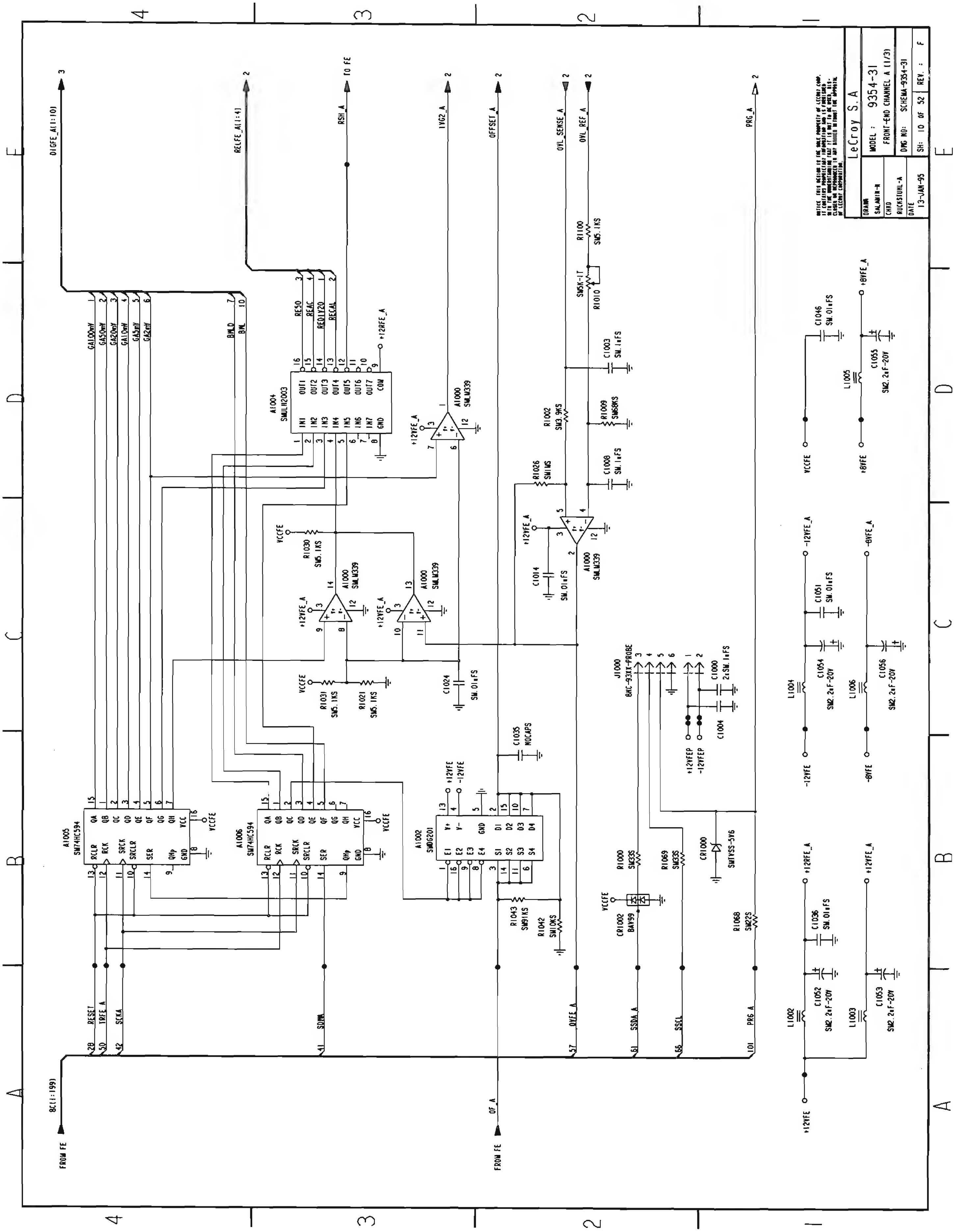

BUFFER MEM WRITE
MEMORY CONTROL
MAIN DECODER
LeCroy S.A
MODEL : 9354-31
µP CONTROL (4/5)
DWG NO: SCHEMA-9354-31
SH: 5 OF 52
REV. : F
13-JAN-95

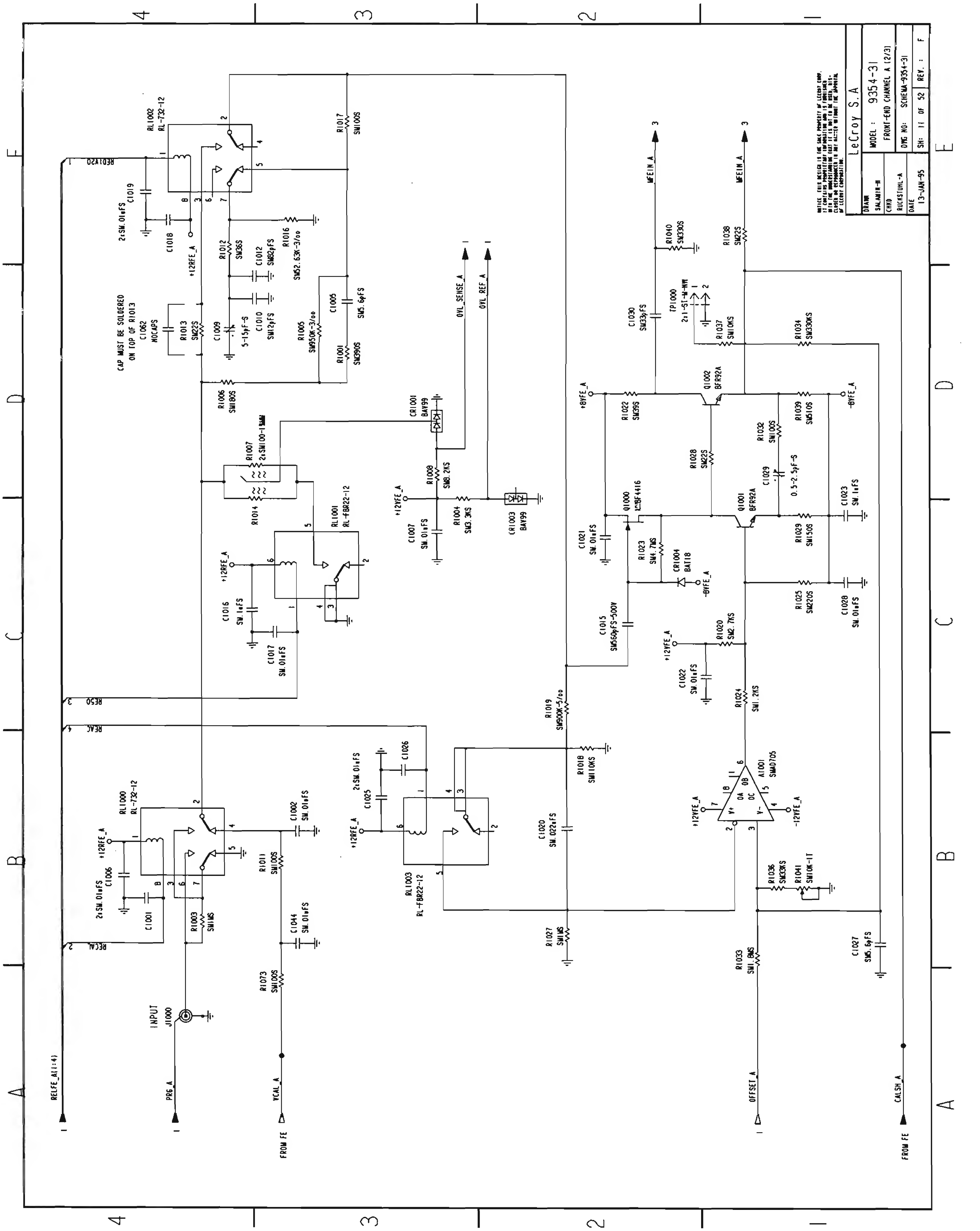

SCANNING DAC
LeCroy S.A
MODEL : 9354-31
µP CONTROL (5/5)
DWG NO: SCHEMA-9354-31
SH: 6 OF 32
REV. : F
13-JAN-95
TO FRONTEND
TO TIMEBASE
TO ADC
TO FE

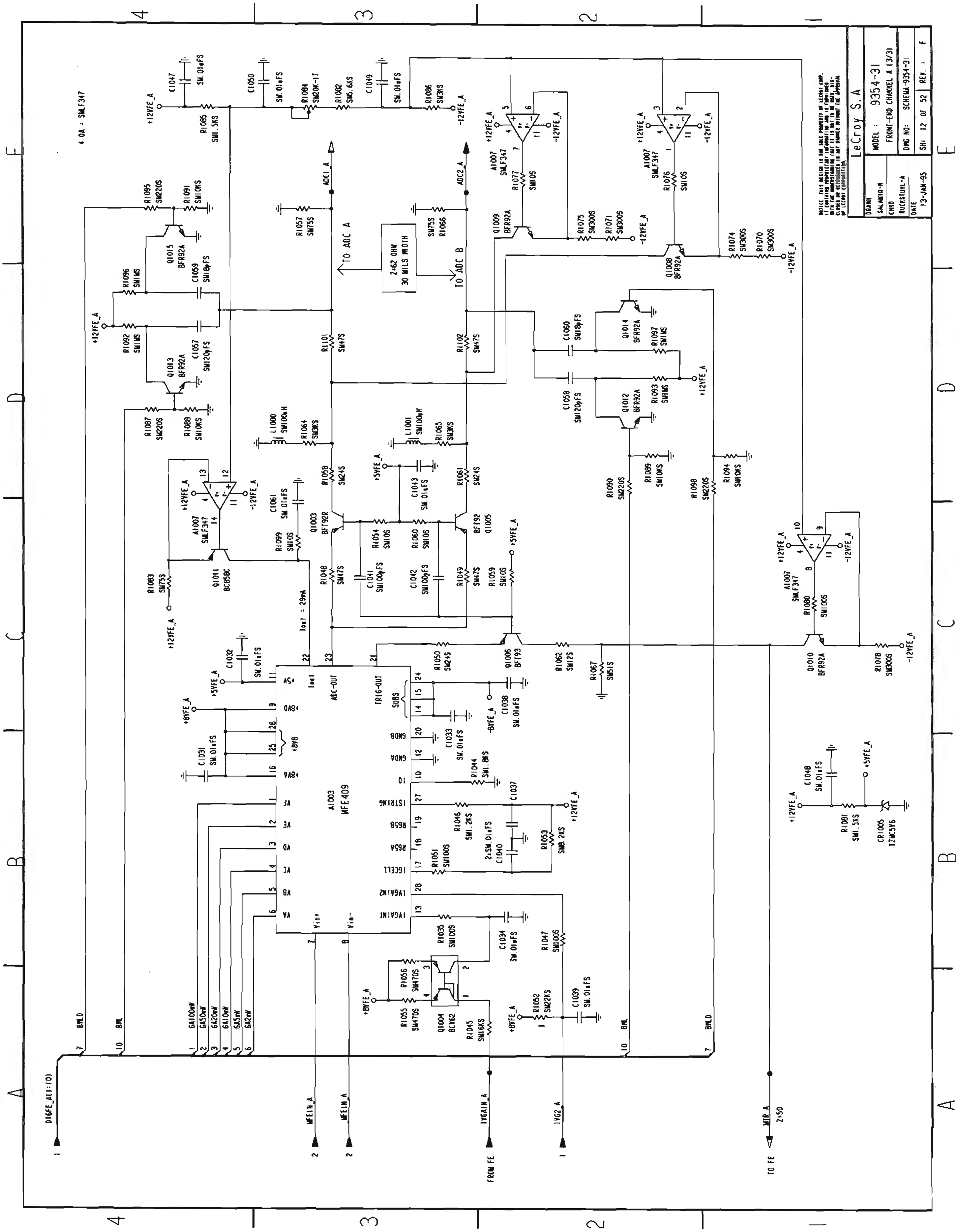

UNMOUNTED COMPONENT FOR 9350-31:
(SEE TOP LEVEL SHEET1)
FE CHA
FE CHB
FE CHC
FE CHD
LeCroy S.A
9354-31
FRONT-END (1/31)
SCHEMA-9354-31
13-JAN-95

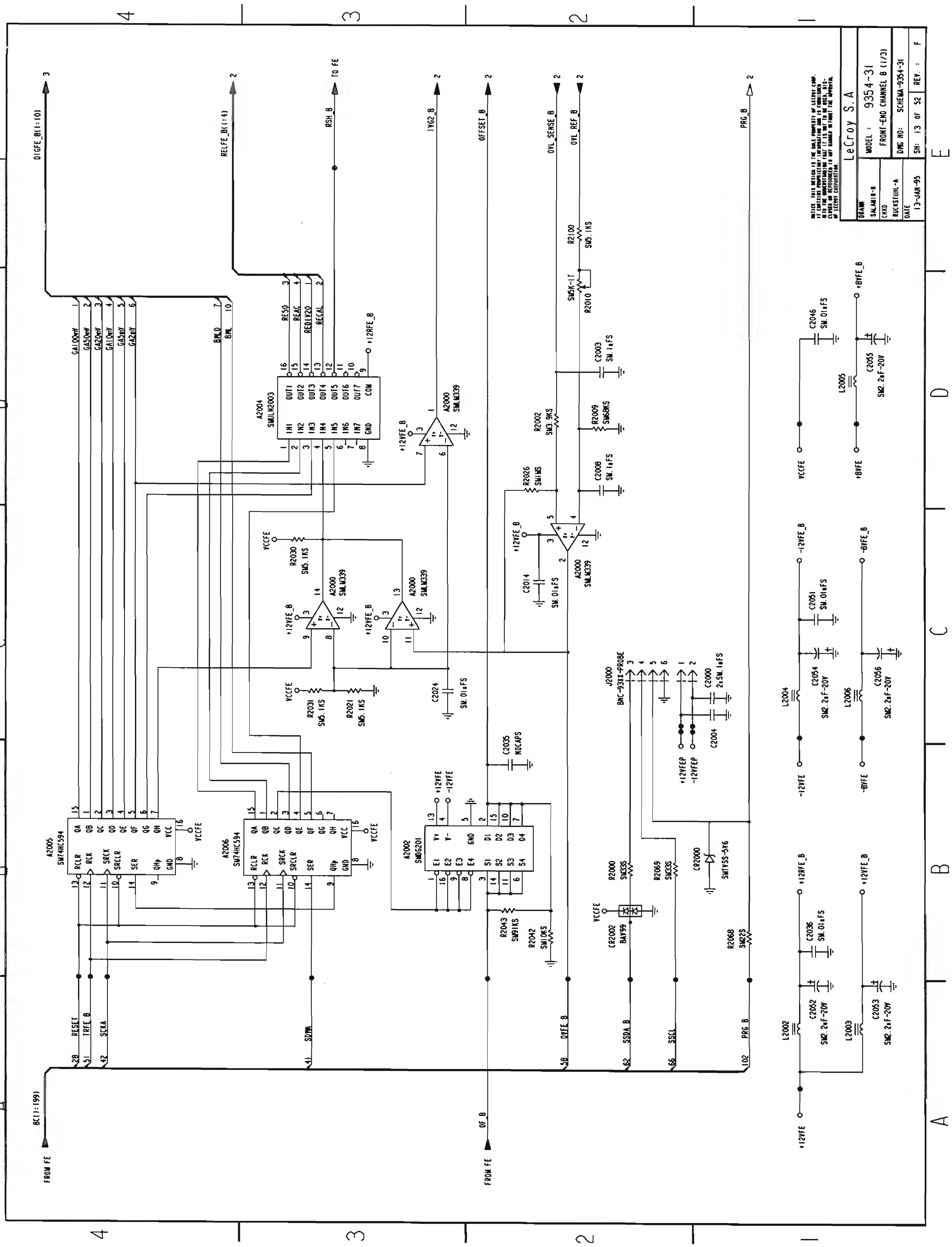

LeCroy S.A
MODEL : 9354-31
FRONT-END (2/3)
DWG NO: SCHEMA-9354-31
SH: 8 OF 52
REV. : F
DATE 13-JAN-95
FE TRIG
PROBE CAL.
TO TB
FROM TB
EXTCK
MTR_A
MTR_B
MTR_C
MTR_D
CALSH_B
CALSH_C
VCAL
CKPCAL
DAC(0:25)
BC(1:199)
BT(1:30)
A200
A201
A205
A206
A207
A208
SMDG442
SMDG201

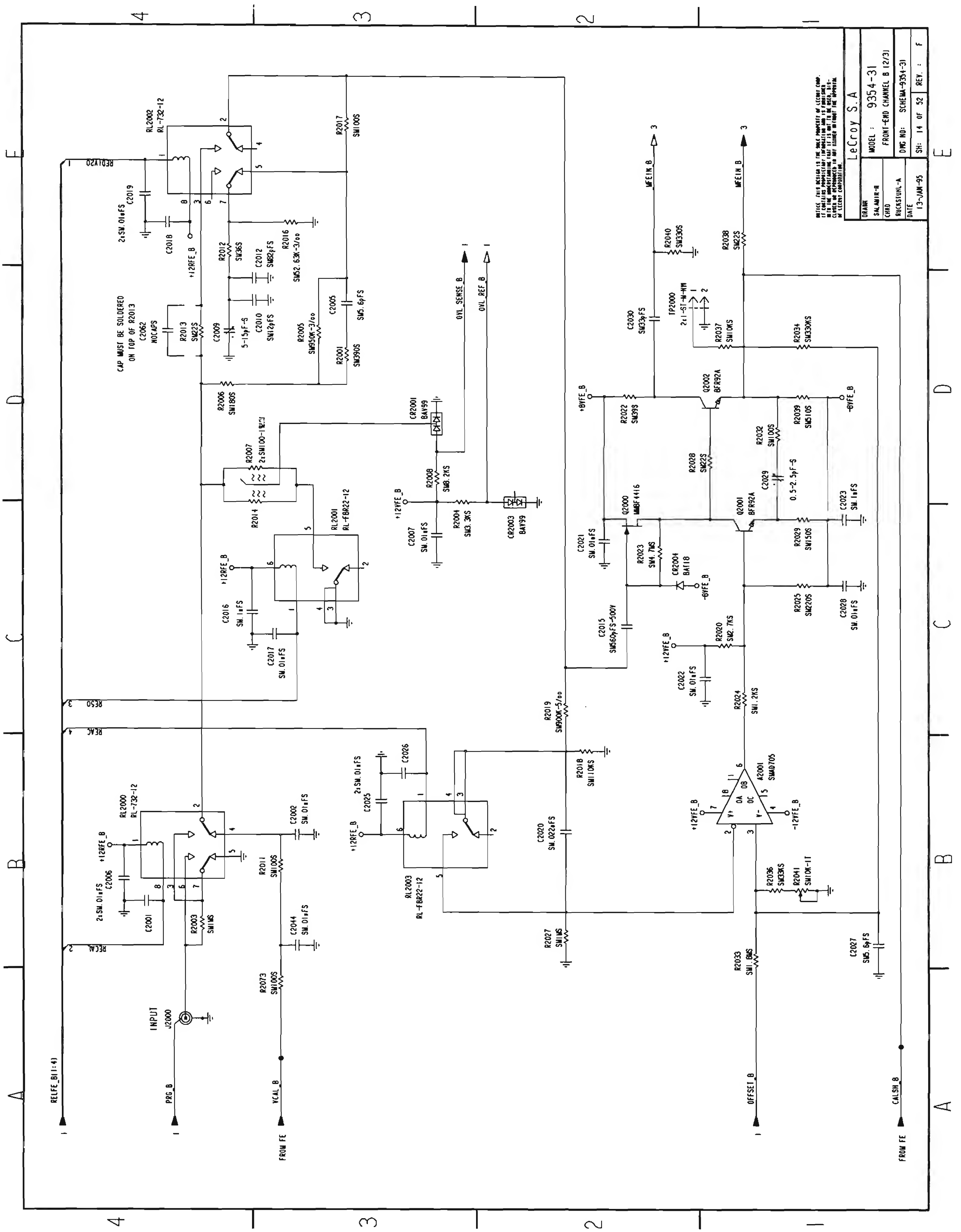

LeCroy S.A
MODEL : 9354-31
FRONT-END (3/3)
DWG NO: SCHEMA-9354-31
SH: 9 OF 52
REV. : F
DATE 13-JAN-95

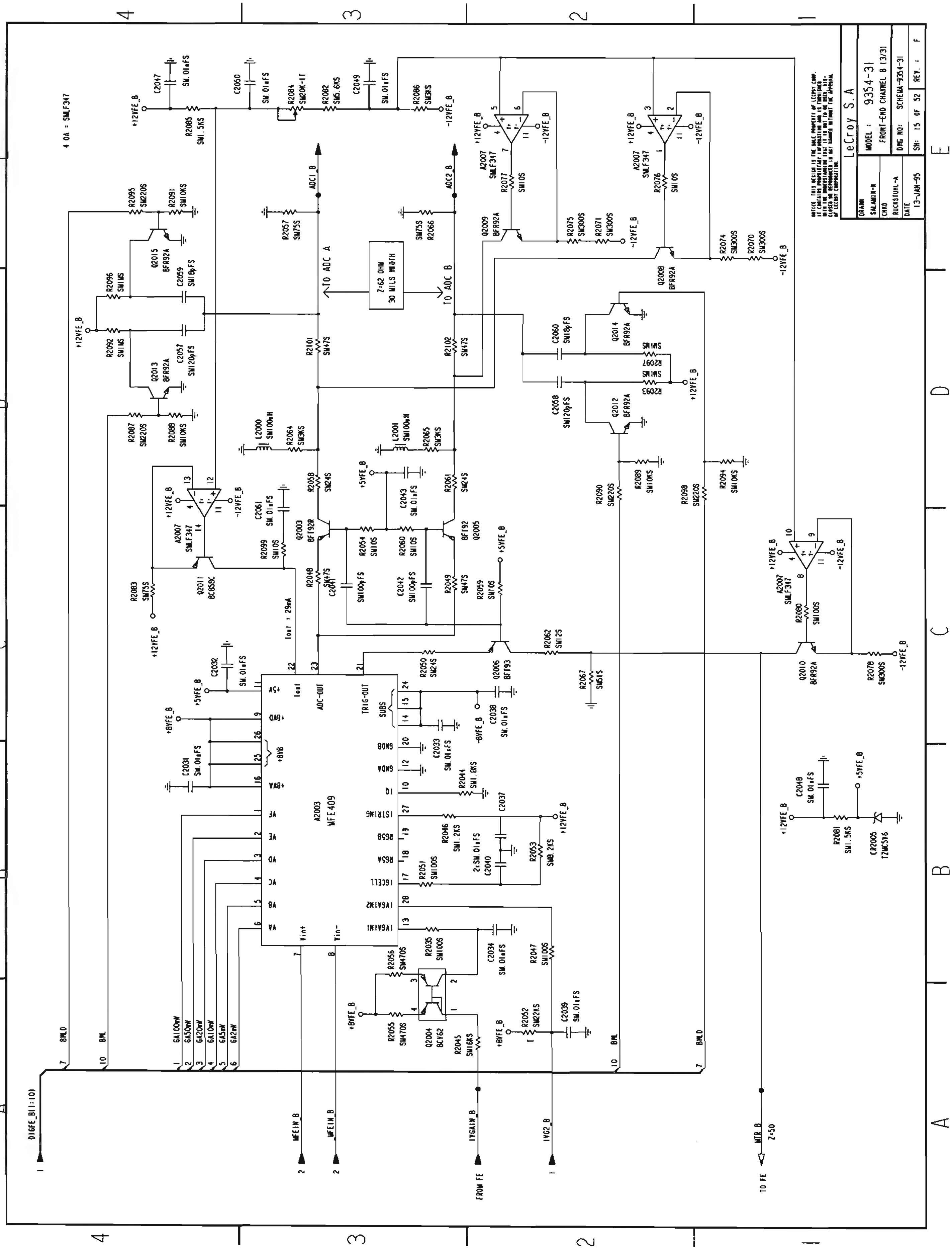

LeCroy S.A
MODEL : 9354-31
FRONT-END CHANNEL A (1/3)
DWG NO: SCHEMA-9354-31
SH: 10 OF 52
REV. : F
DATE 13-JAN-95

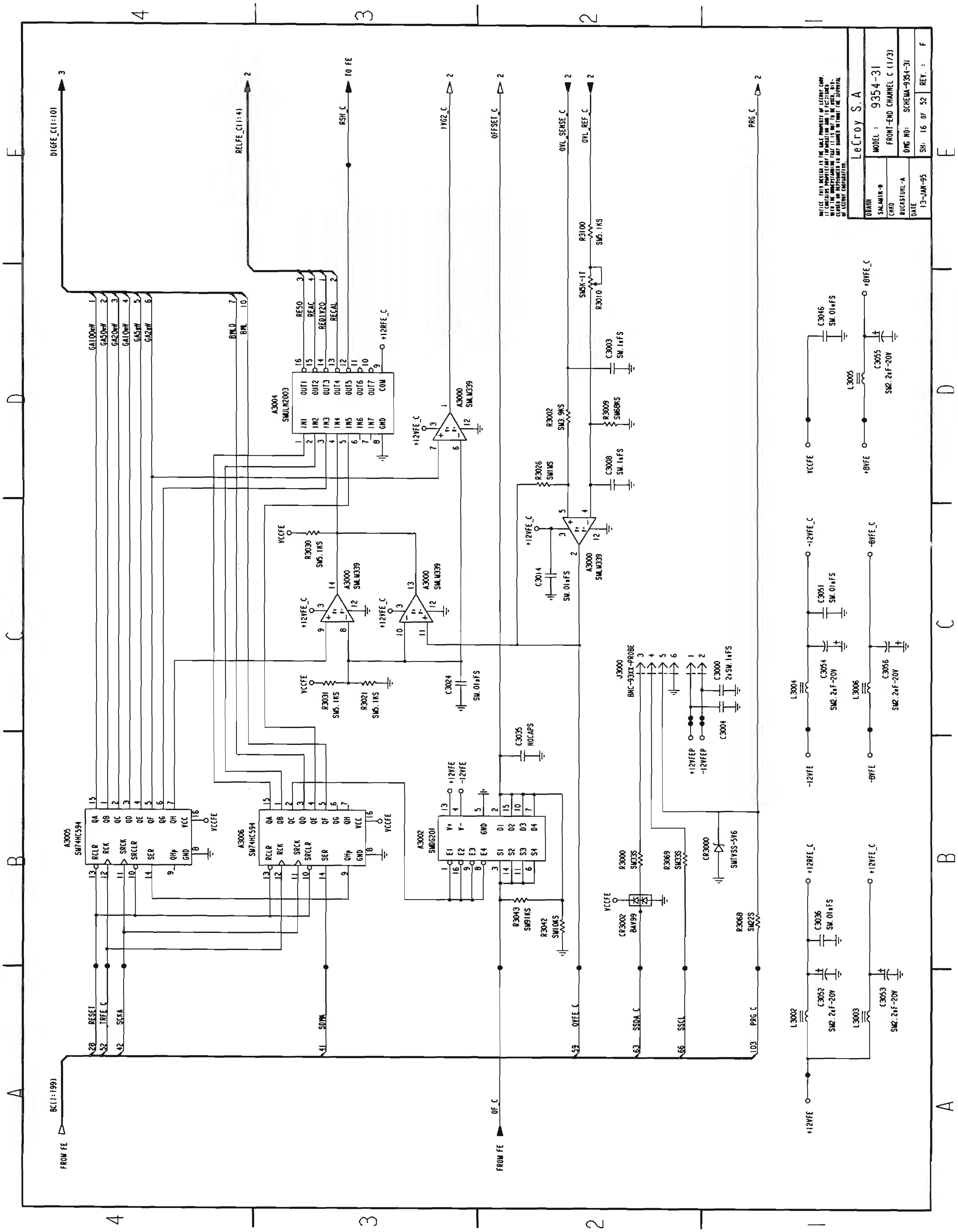

LeCroy S.A
MODEL : 9354-31
FRONT-END CHANNEL A (2/3)
SCHEMA-9354-31

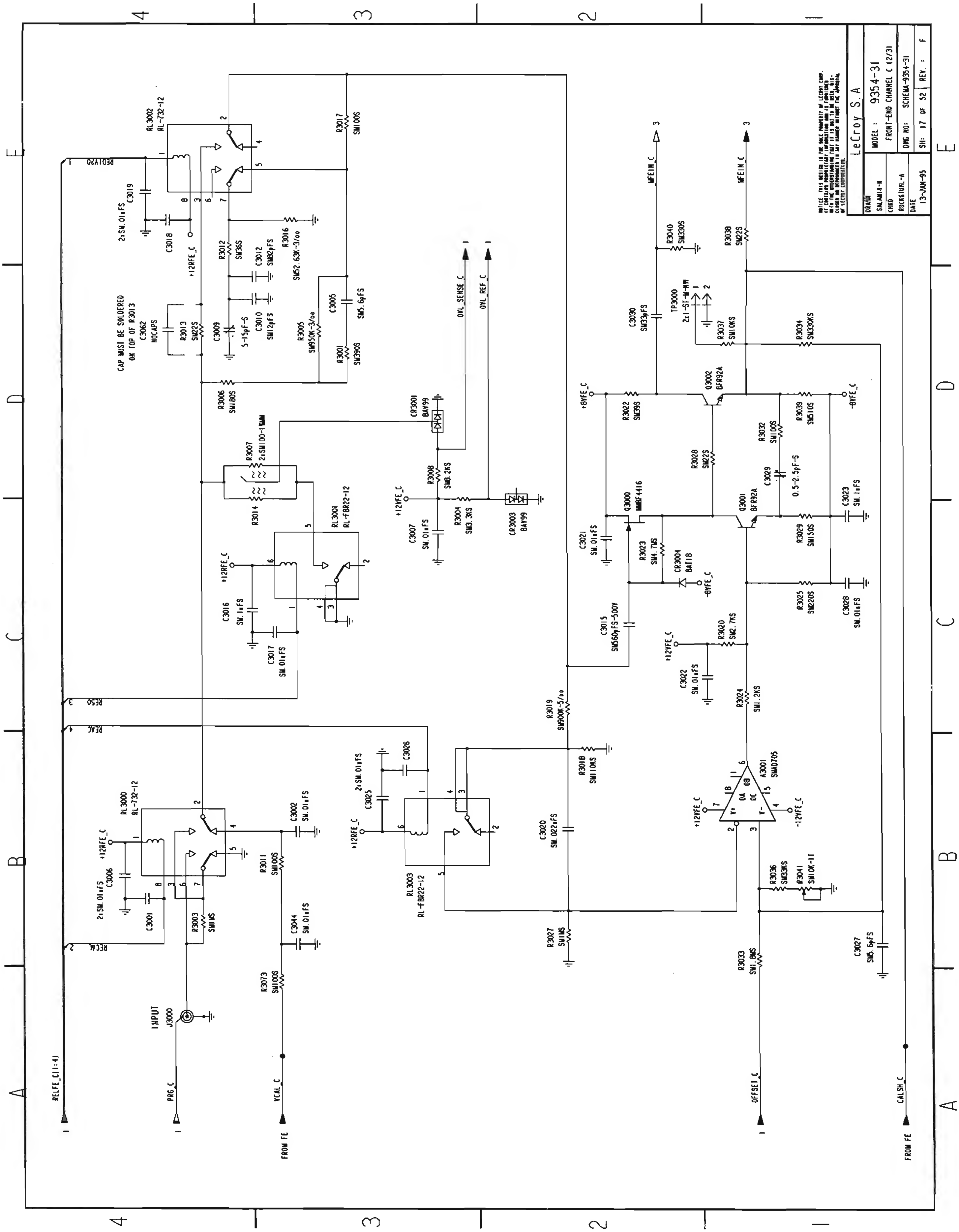

LeCroy S.A
MODEL : 9354-31
FRONT-END CHANNEL A (3/3)
DWG NO: SCHEMA-9354-31
SH: 12 OF 52
REV. : F
DATE 13-JAN-95

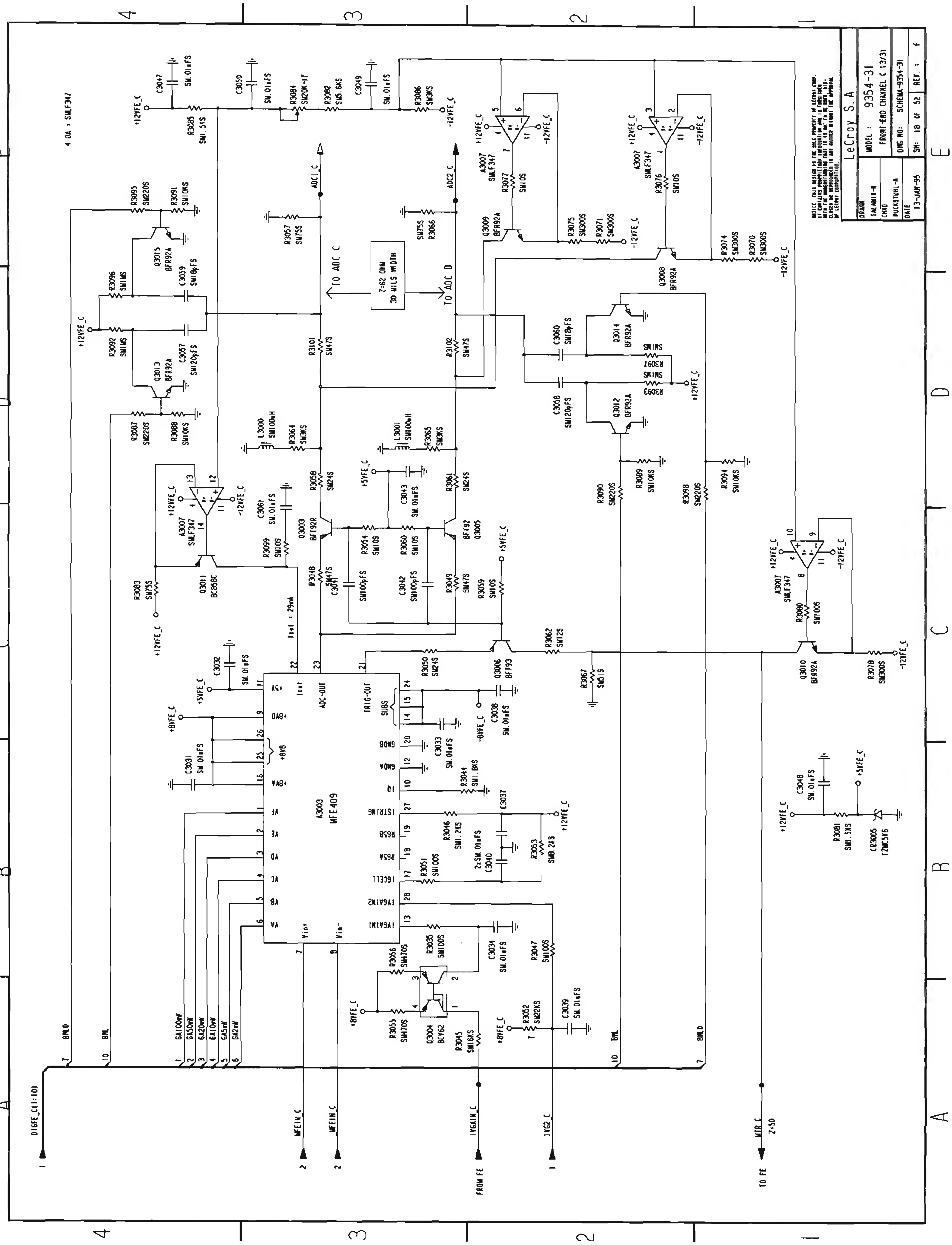

LeCroy S.A
MODEL : 9354-31
FRONT-END CHANNEL B (1/3)
DWG NO: SCHEMA-9354-31
SH: 13 OF 52
REV. : F
DRAWN SALAMIN-N
CHKD RUCKSTUHL-A
DATE 13-JAN-95

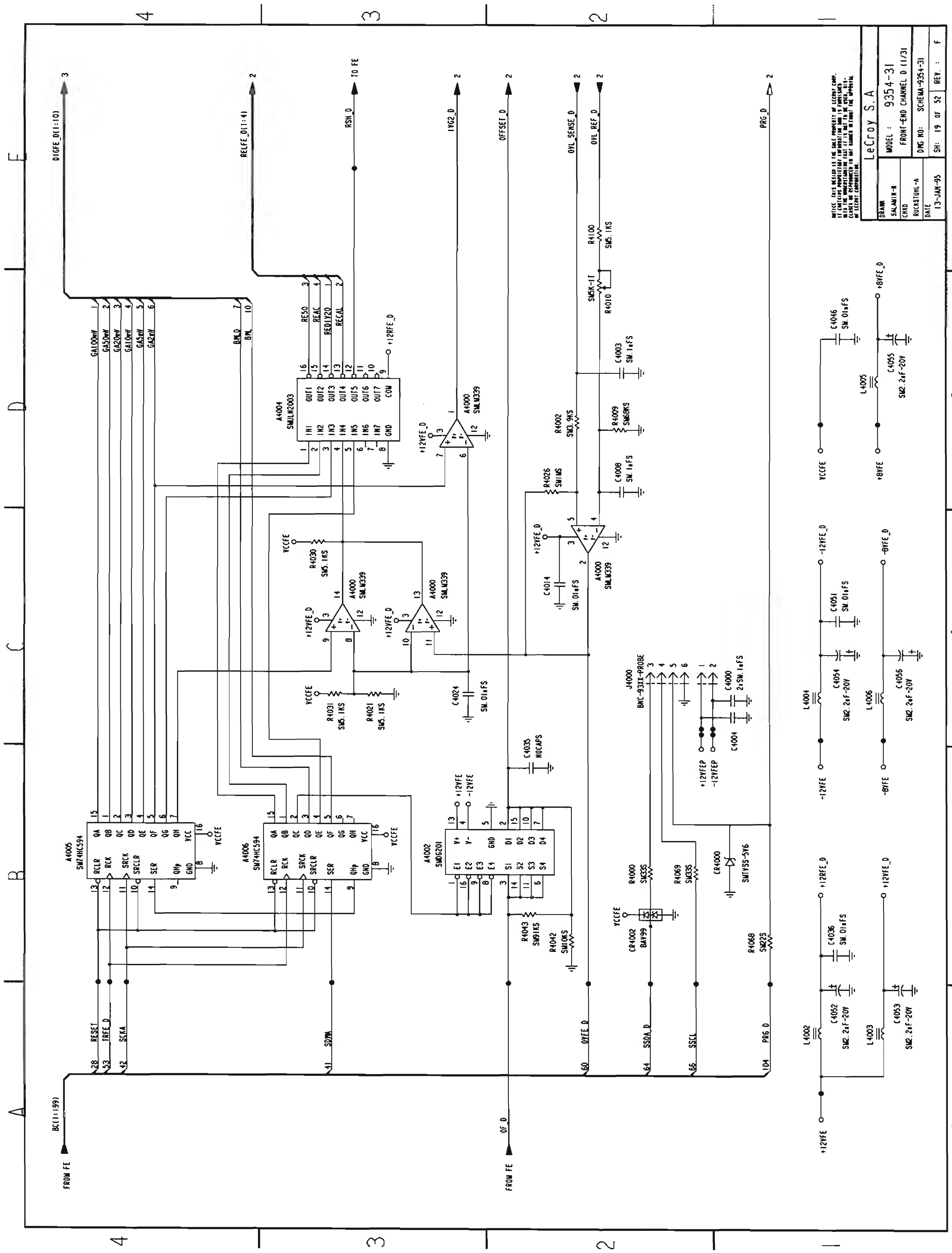

LeCroy S.A
9354-31
FRONT-END CHANNEL B (2/3)
SCHEMA-9354-31
13-JAN-95

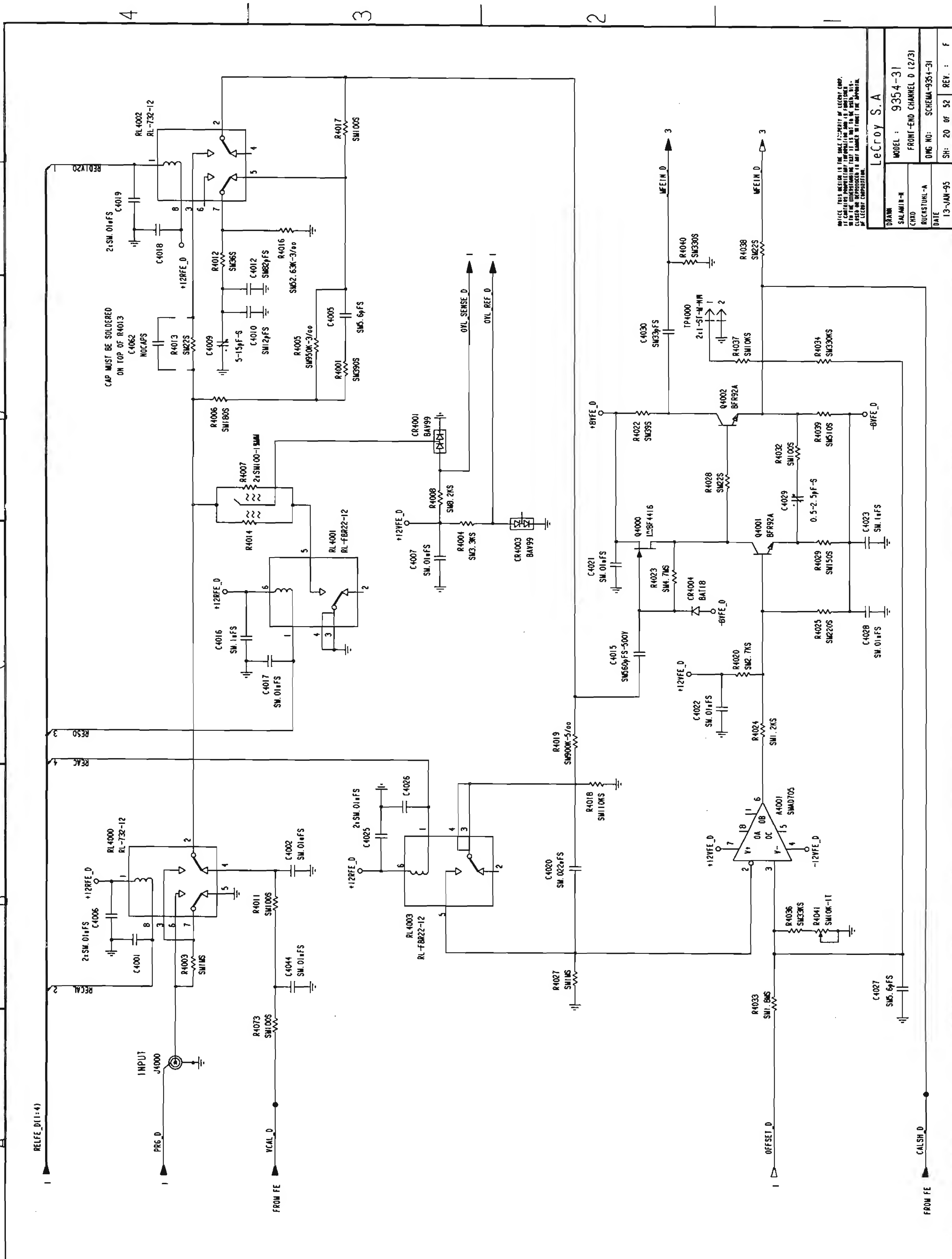

LeCroy S.A
MODEL : 9354-31
FRONT-END CHANNEL B (3/3)
DWG NO: SCHEMA-9354-31
SH: 15 OF 52
13-JAN-95
A2003
MFE409
TO ADC A
TO ADC B
Z=62 OHM
30 MILS WIDTH
FROM FE
TO FE

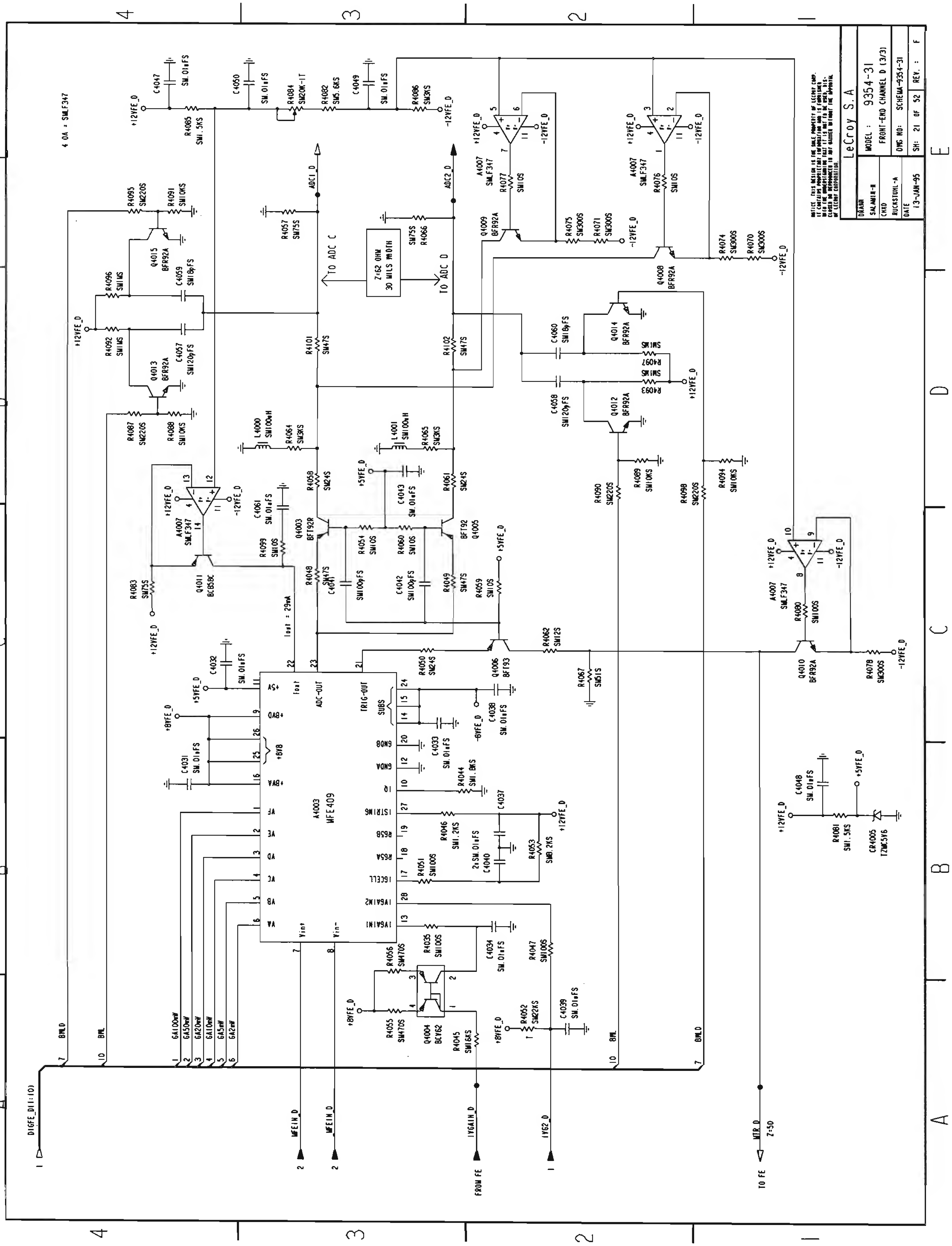

LeCroy S.A
9354-31
FRONT-END CHANNEL C (1/3)
SCHEMA-9354-31
13-JAN-95

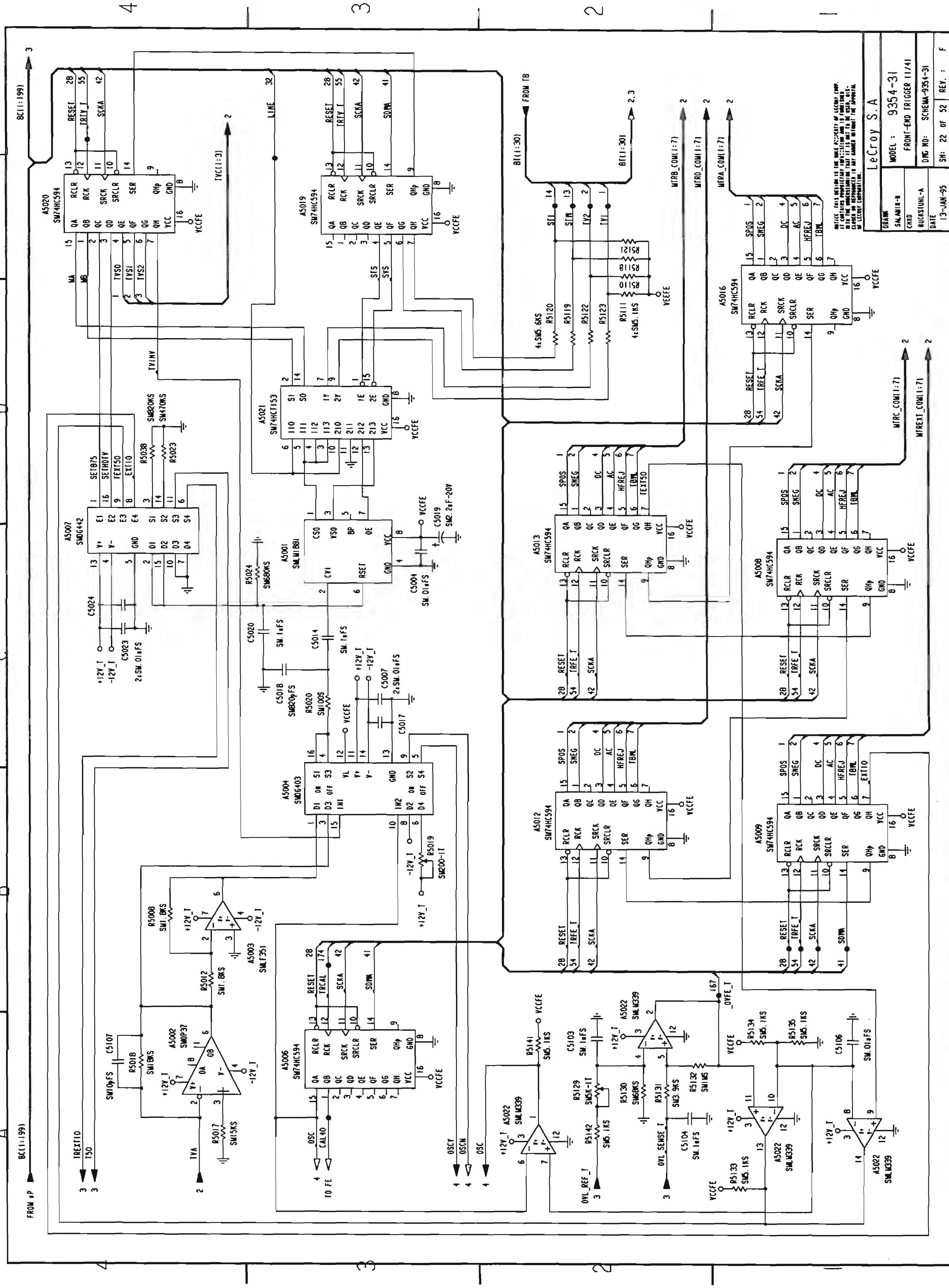

LeCroy S.A
MODEL : 9354-31
FRONT-END CHANNEL C (2/3)
DWG NO: SCHEMA-9354-31
SH: 17 OF 52
REV. : F
DRAWN SALAMIN-N
CHKD RUCKSTUHL-A
DATE 13-JAN-95
CAP MUST BE SOLDERED ON TOP OF R3013
INPUT
J3000
RELFE_C(1:4)
PRG_C
VCAL_C
FROM FE
OFFSET_C
CALSH_C
FROM FE
OVL_SENSE_C
OVL_REF_C
MFEIN_C
MFEIN_C

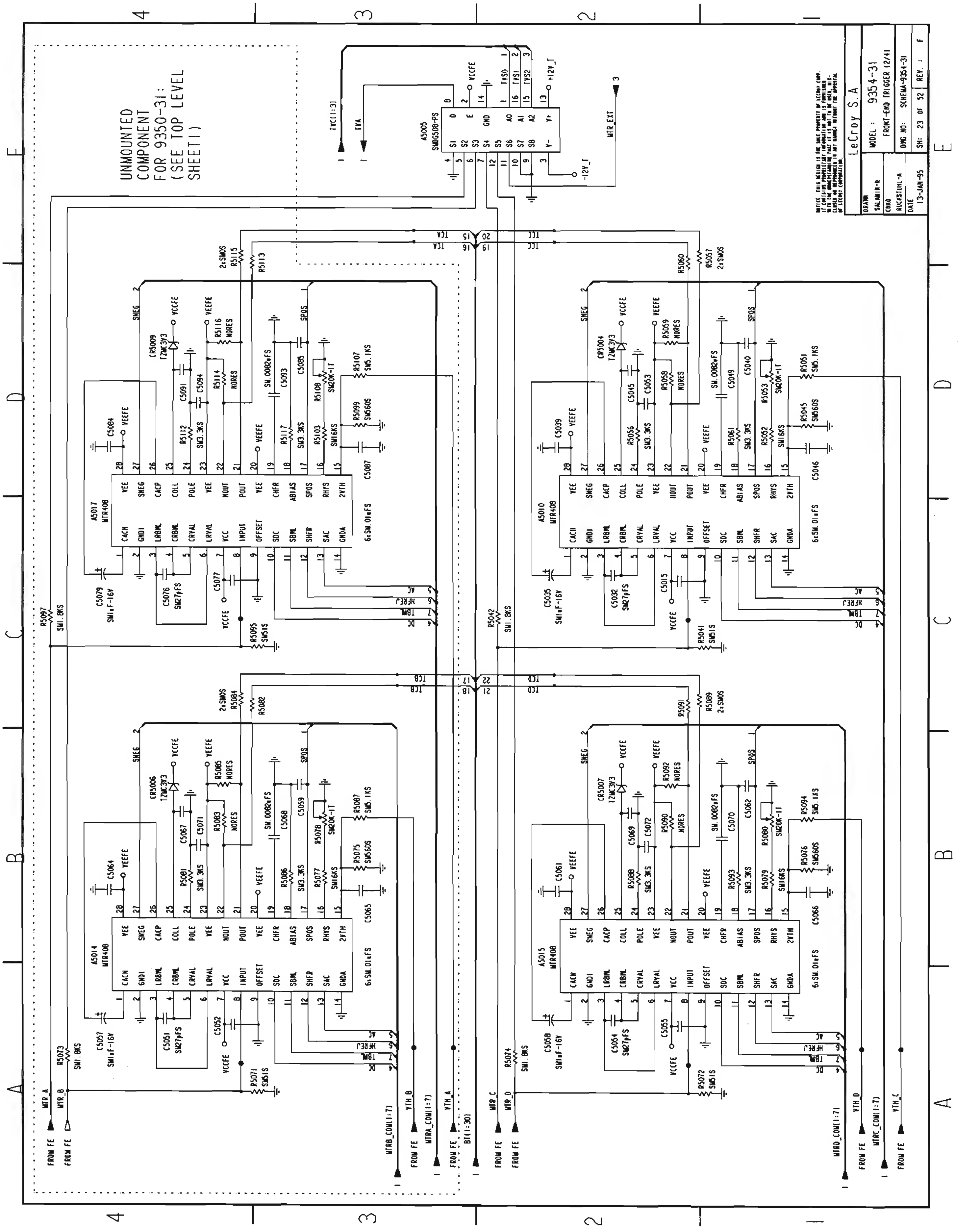

LeCroy S.A
MODEL: 9354-31
FRONT-END CHANNEL C (3/3)
DWG NO: SCHEMA-9354-31
SH: 18 OF 52
REV.: F
DATE 13-JAN-95

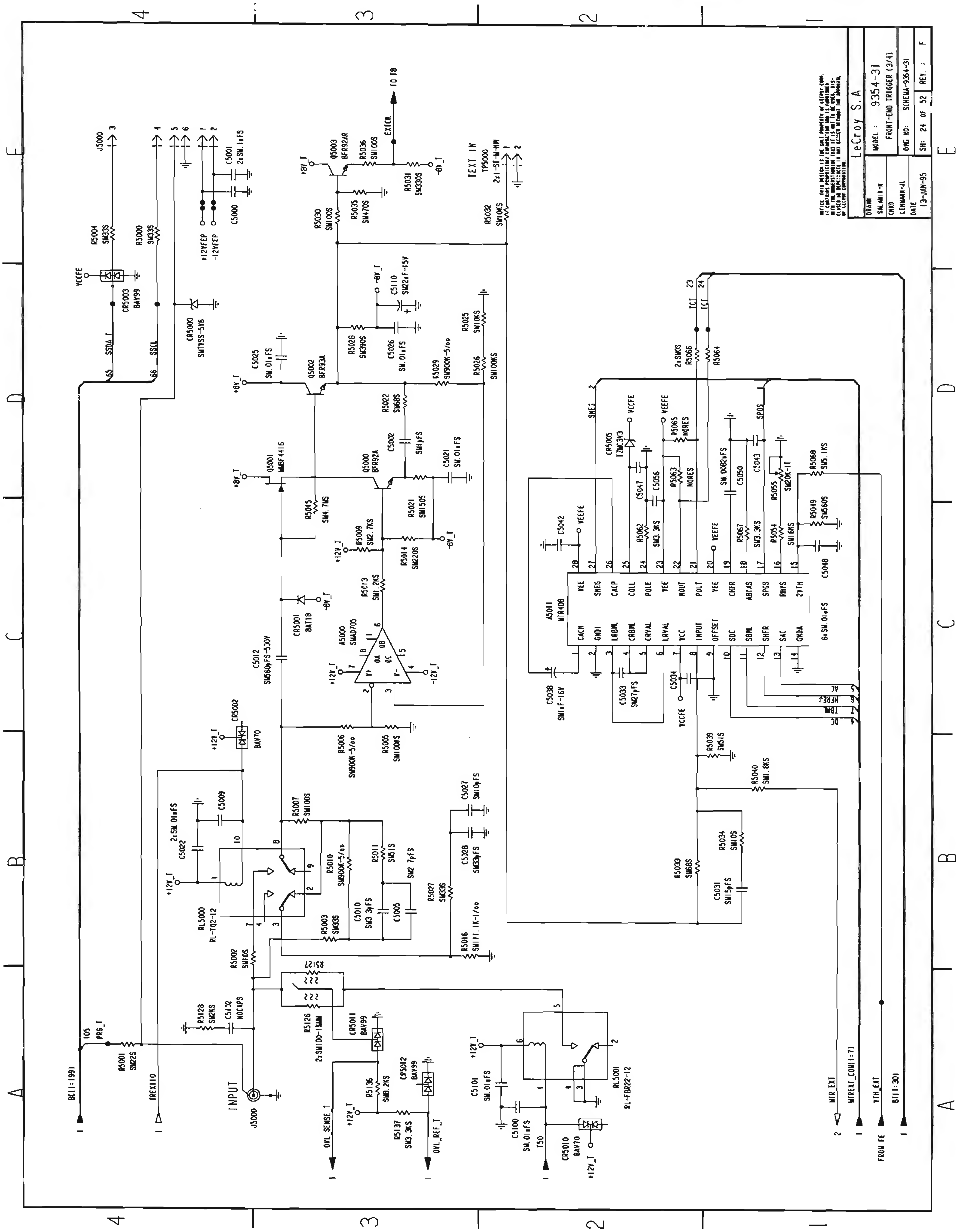

LeCroy S.A
MODEL : 9354-31
FRONT-END CHANNEL D (1/31
DWG NO: SCHEMA-9354-31
SH: 19 OF 52
REV. : F
13-JAN-95

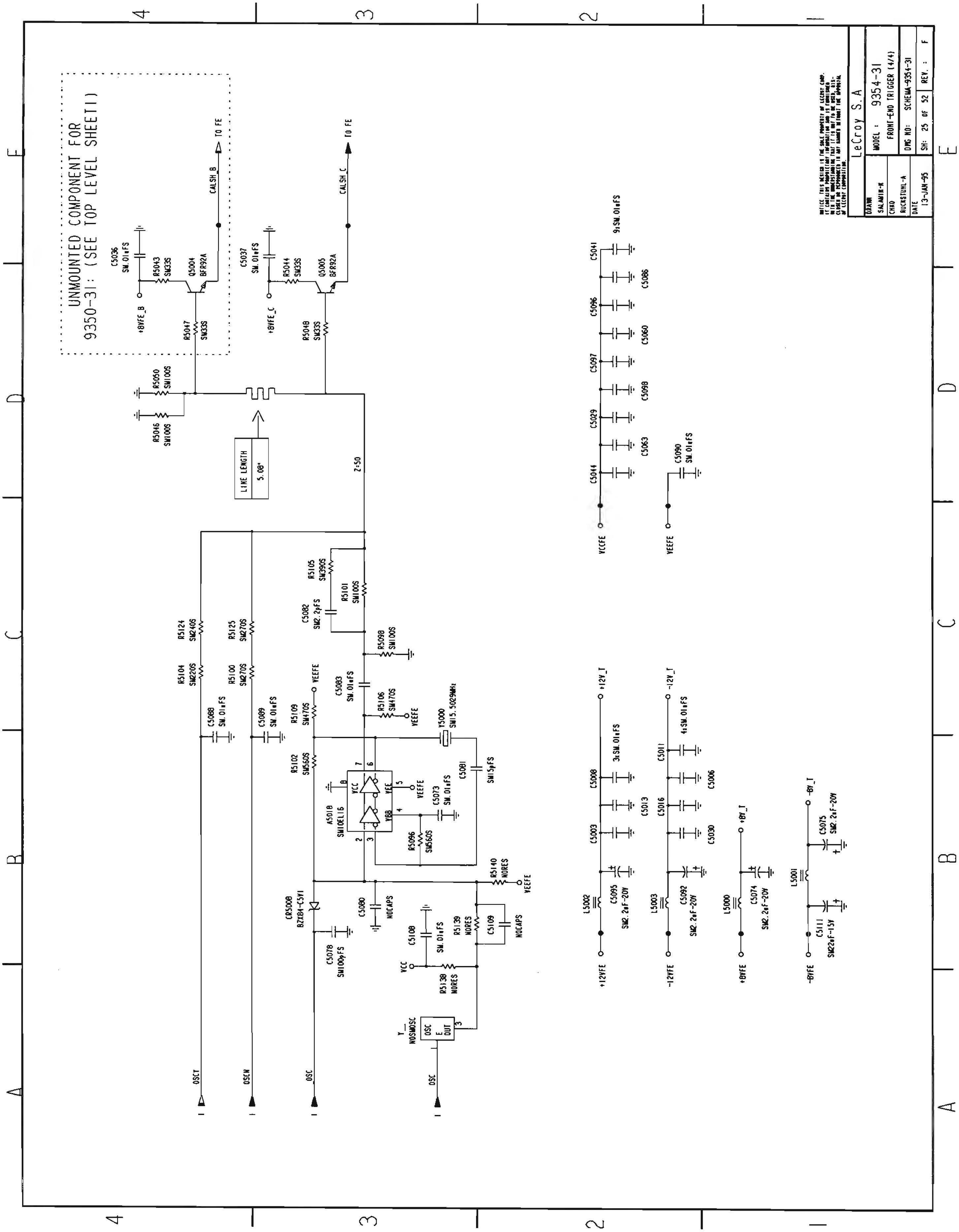

LeCroy S.A
MODEL : 9354-31
FRONT-END CHANNEL D (2/3)
DWG NO: SCHEMA-9354-31
SH: 20 OF 52
REV. : F
DRAWN SALAMIN-M
CHKD RUCKSTUHL-A
DATE 13-JAN-95
INPUT
J4000
CAP MUST BE SOLDERED ON TOP OF R4013
OVL_SENSE_D
OVL_REF_D
VFEIN_D
OFFSET_D
CALSH_D
VCAL_D
PRG_D
RELFE_D(1:4)
FROM FE

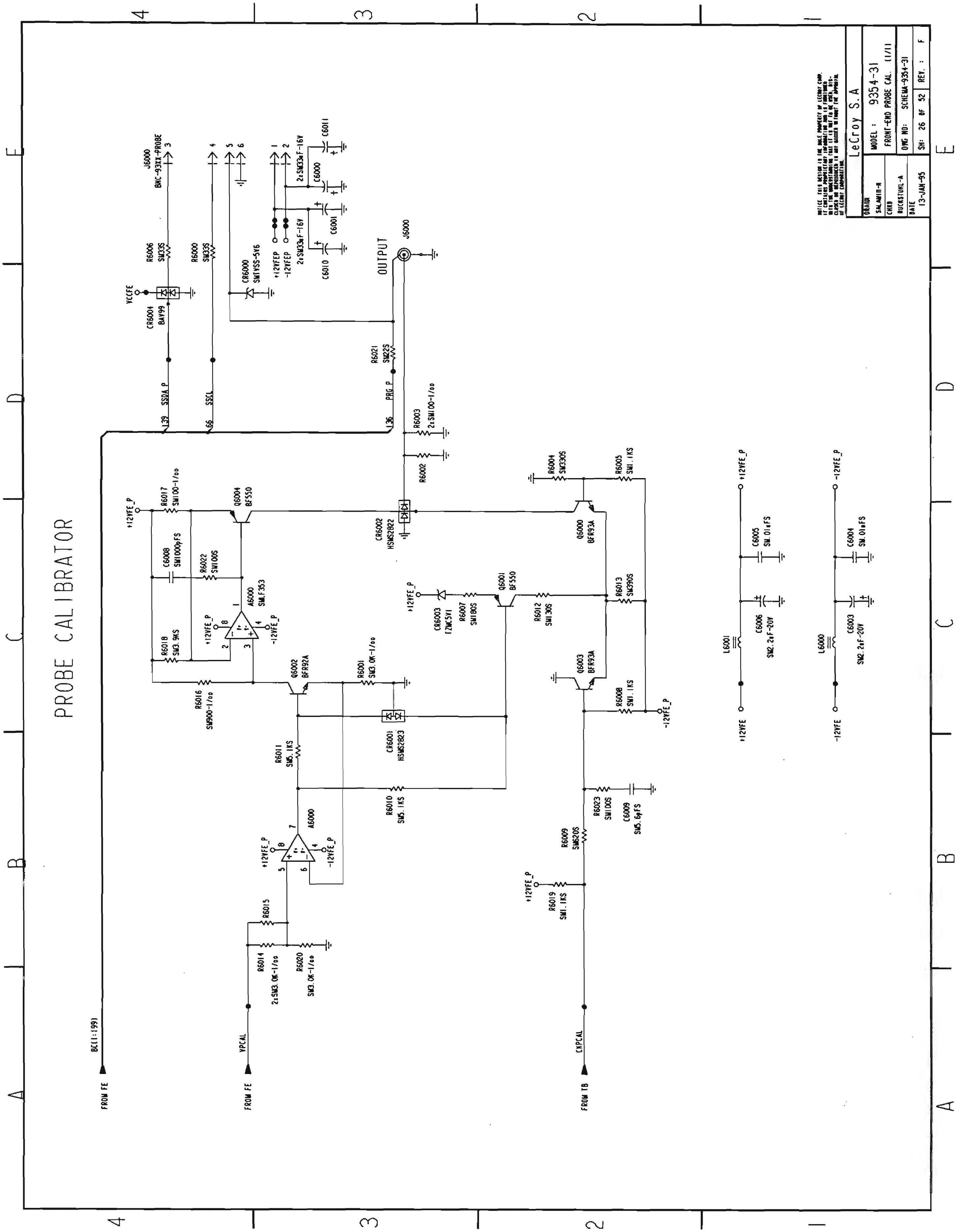

LeCroy S.A
9354-31
FRONT-END CHANNEL D (3/3)
SCHEMA-9354-31

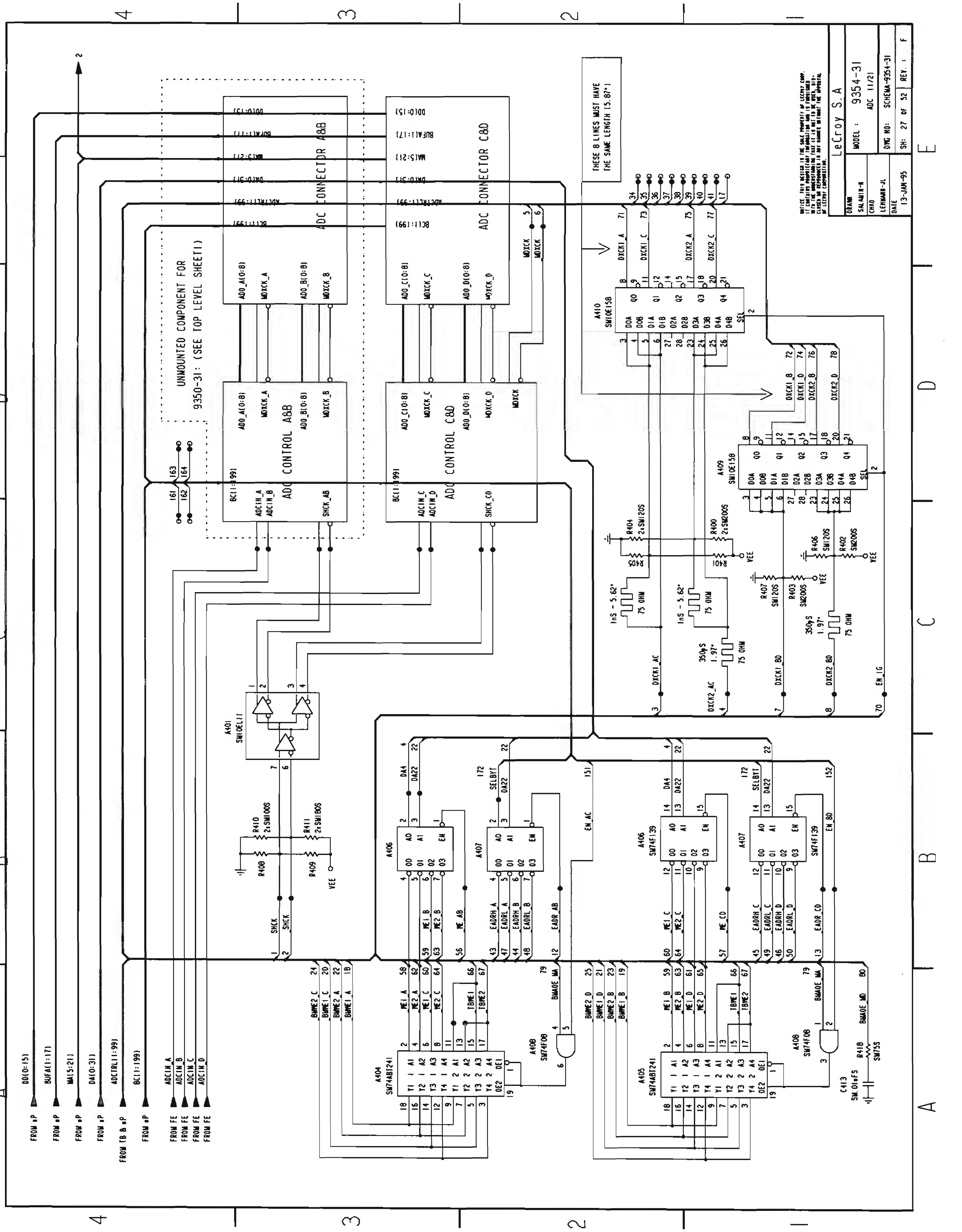


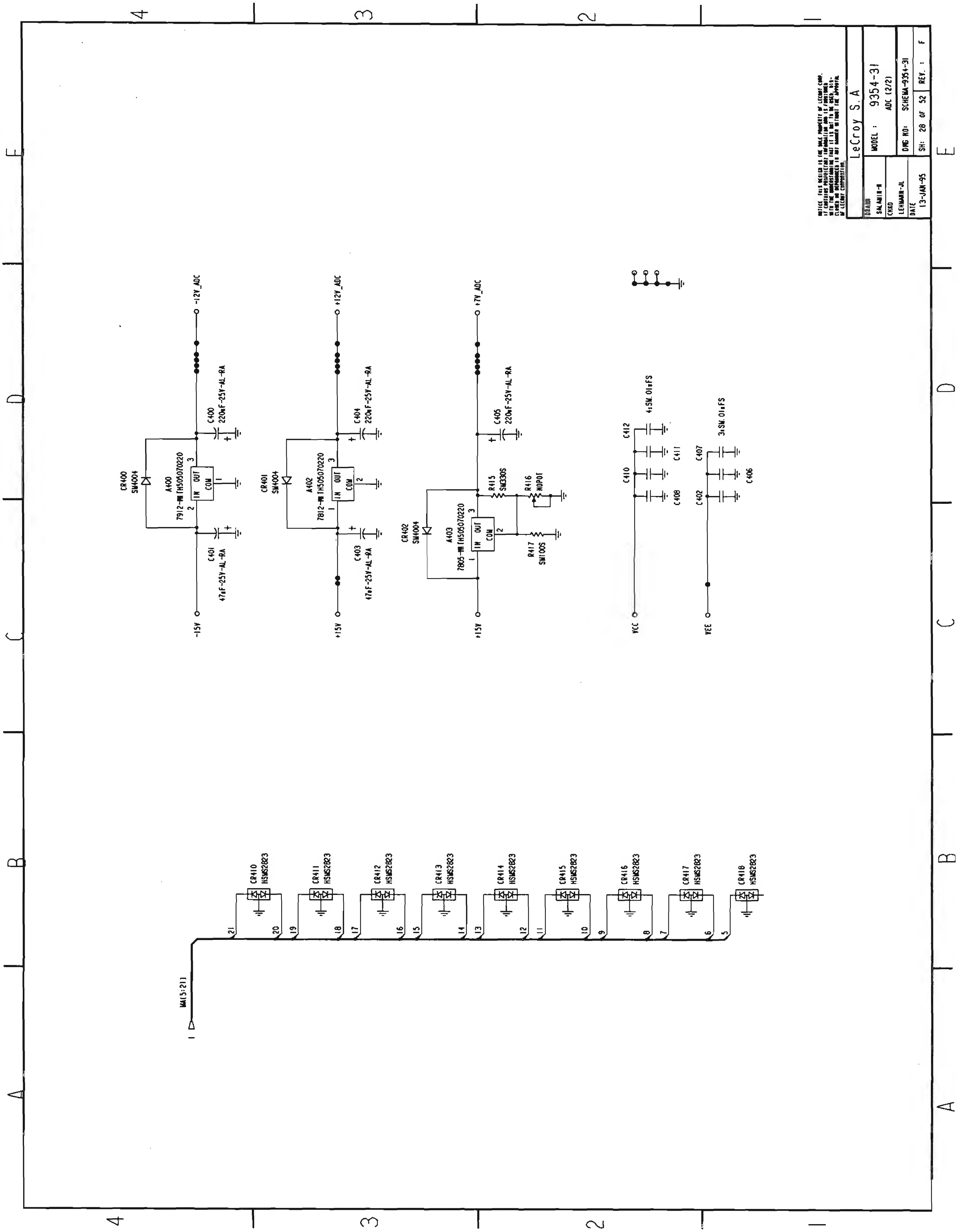

UNMOUNTED COMPONENT FOR 9350-31: (SEE TOP LEVEL SHEET1)
LeCroy S.A
MODEL: 9354-31
FRONT-END TRIGGER (2/4)
DWG NO: SCHEMA-9354-31
SH: 23 OF 52
REV.: F
DRAWN SALAMIN-R
CHKD RUCKSTUHL-A
DATE 13-JAN-95
A5017 MTR408
A5010 MTR408
A5014 MTR408
A5015 MTR408
A5005 SMDG508-PS
FROM FE

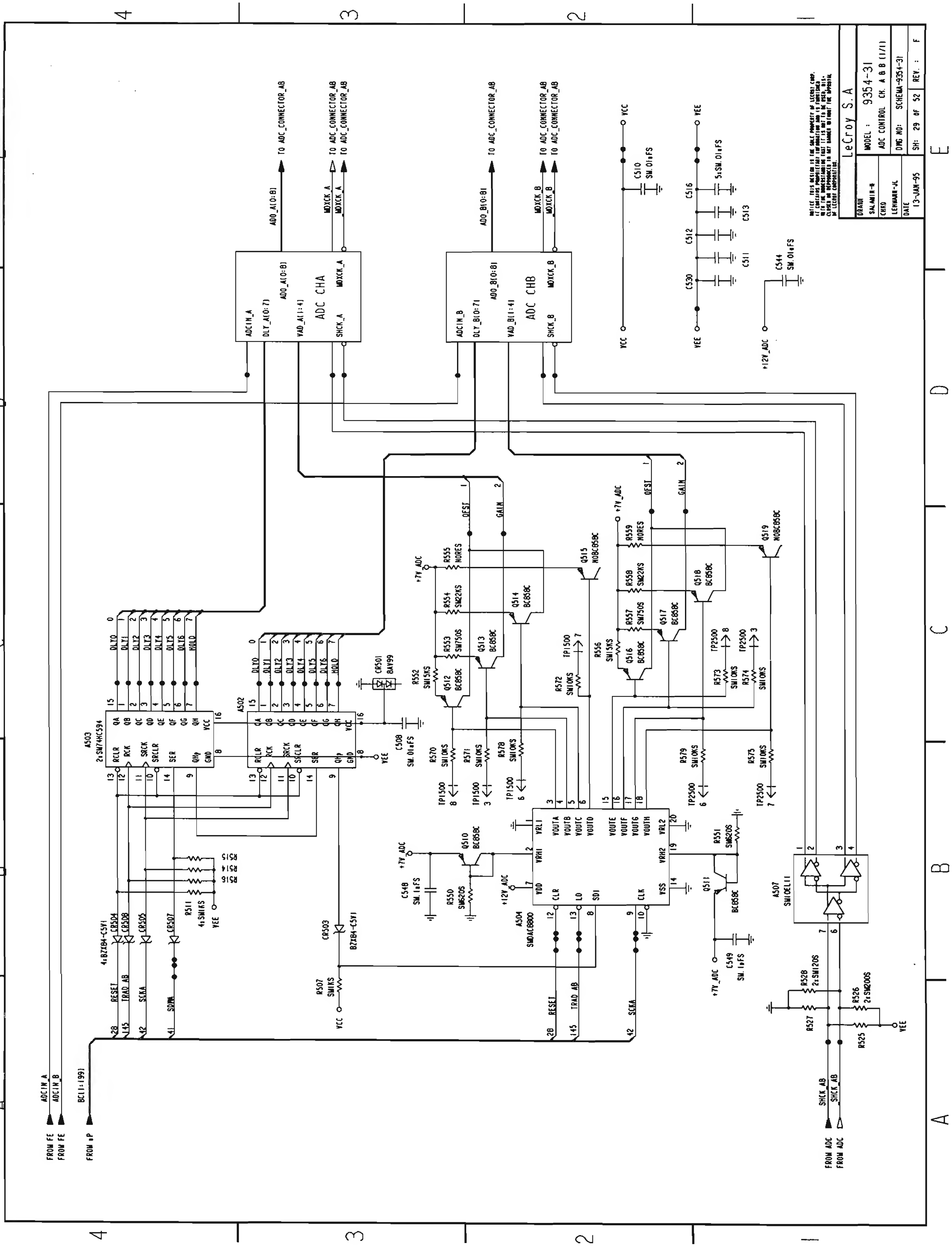

LeCroy S.A
MODEL: 9354-31
FRONT-END TRIGGER (3/4)
DWG NO: SCHEMA-9354-31
SH: 24 OF 52
REV.: F
13-JAN-95
INPUT
J5000
A5011
MTR408
A5000
TEXT IN
EXTCK
TO TB
MTR_EXT
VTH_EXT
FROM FE

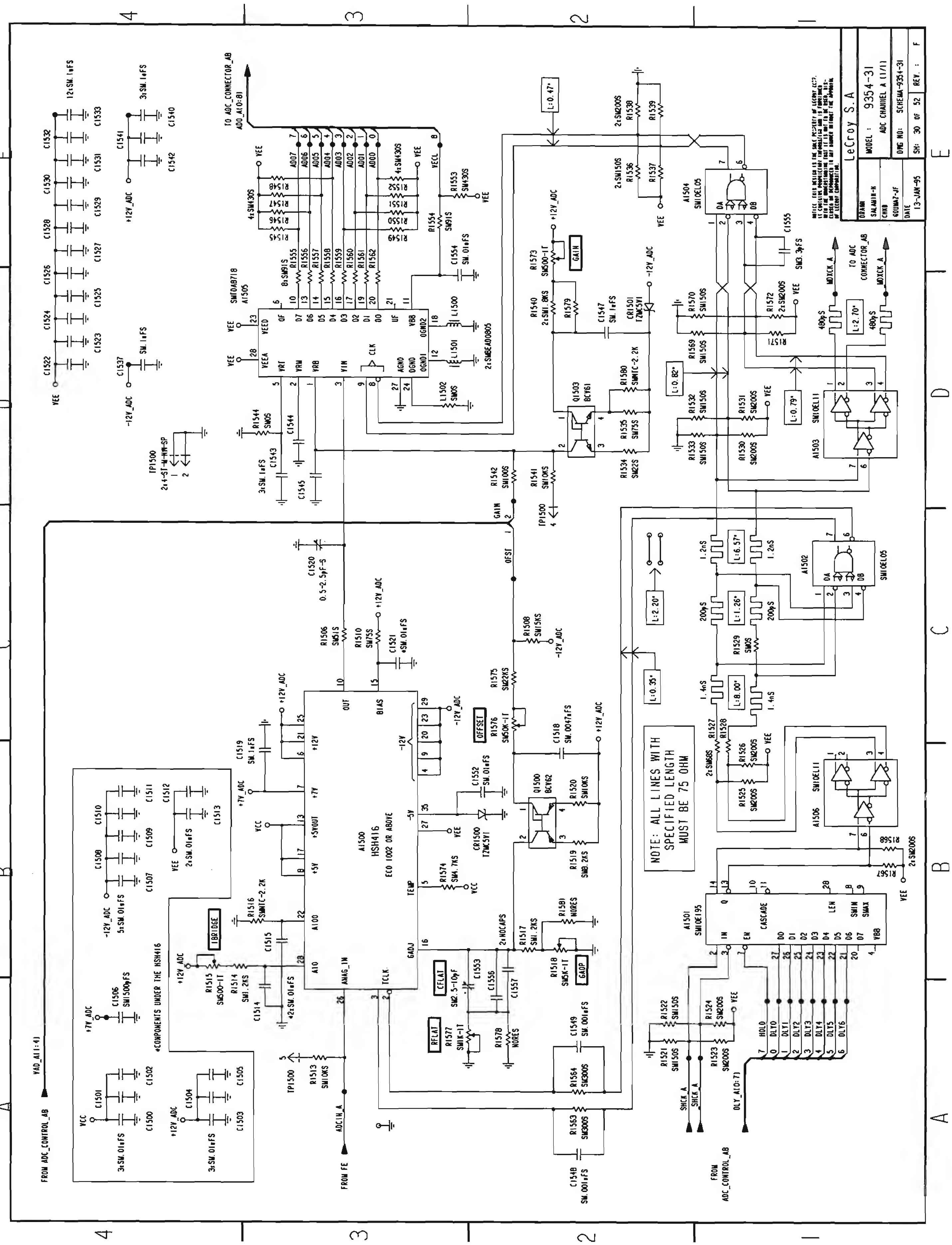

UNMOUNTED COMPONENT FOR
9350-31: (SEE TOP LEVEL SHEET1)
LeCroy S.A
MODEL : 9354-31
FRONT-END TRIGGER (4/4)
DWG NO: SCHEMA-9354-31
SH: 25 OF 52
REV. : F
13-JAN-95


PROBE CALIBRATOR
OUTPUT
FROM FE
FROM FE
FROM TB
LeCroy S.A
MODEL : 9354-31
FRONT-END PROBE CAL. (1/1)
DWG NO: SCHEMA-9354-31
SH: 26 OF 52
REV. : F
13-JAN-95

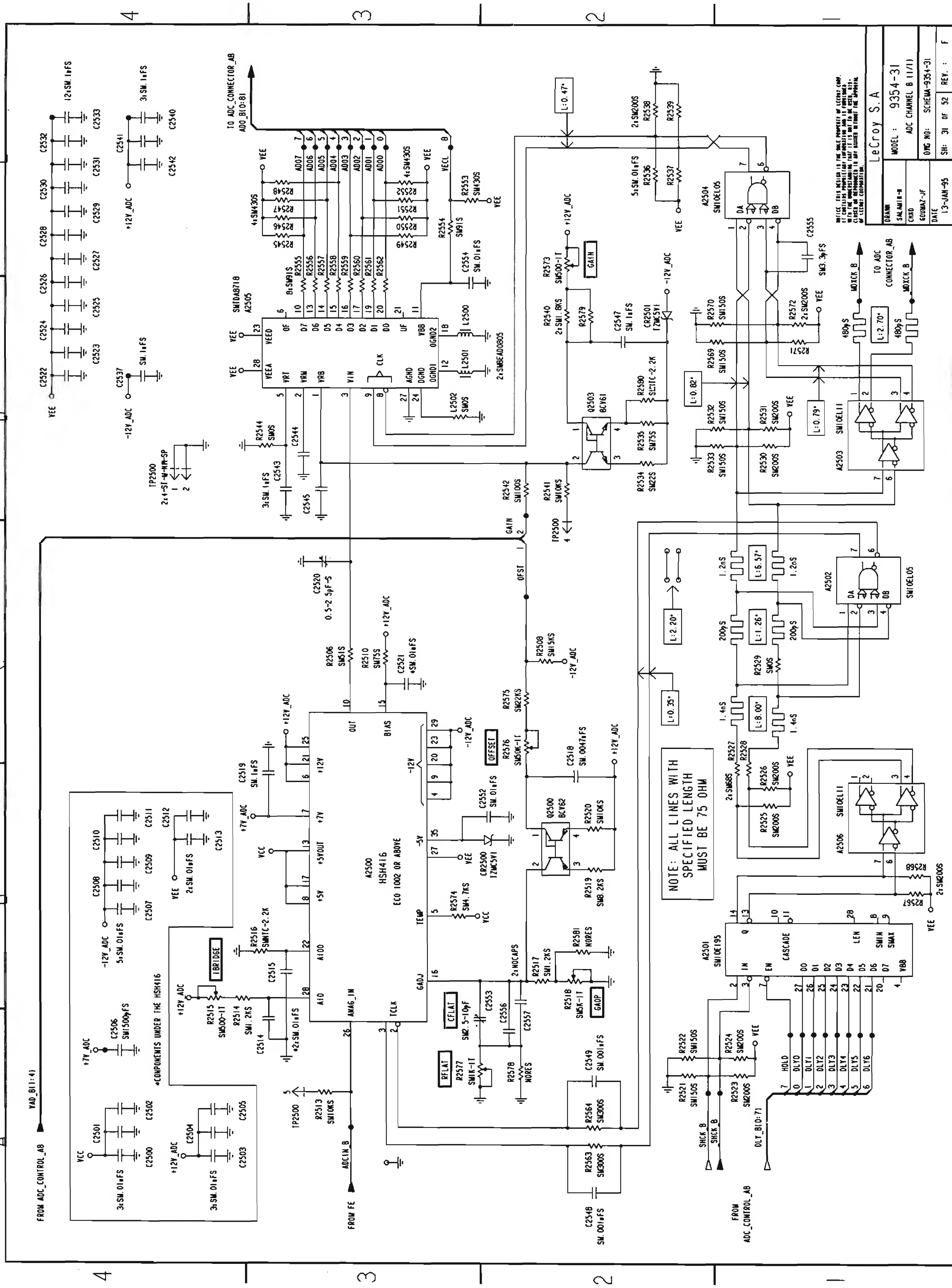

LeCroy S.A
9354-31
ADC (1/2)
SCHEMA-9354-31
SH: 27 OF 52
REV.: F
13-JAN-95
ADC CONNECTOR A&B
ADC CONNECTOR C&D
ADC CONTROL A&B
ADC CONTROL C&D
UNMOUNTED COMPONENT FOR 9350-31: (SEE TOP LEVEL SHEET1)
THESE 8 LINES MUST HAVE THE SAME LENGTH (5.87")

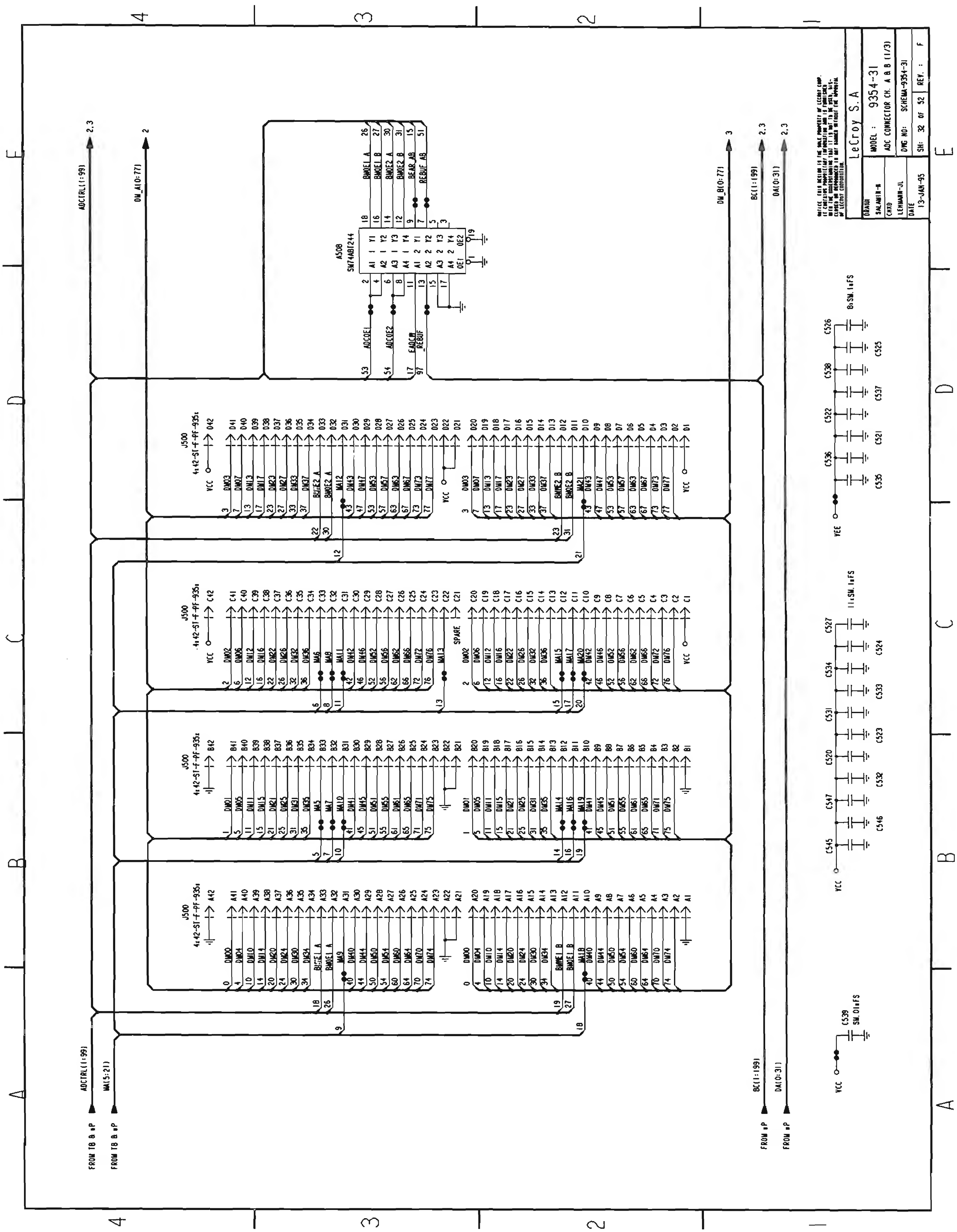

LeCroy S.A
MODEL : 9354-31
ADC (2/2)
DWG NO: SCHEMA-9354-31
SH: 28 OF 52
REV. : F
DRAWN SALAMIN-M
CHKD LEHMANN-JL
DATE 13-JAN-95
-12V_ADC
+12V_ADC
+7V_ADC
-15V
+15V
VCC
VEE
MA(5:21)

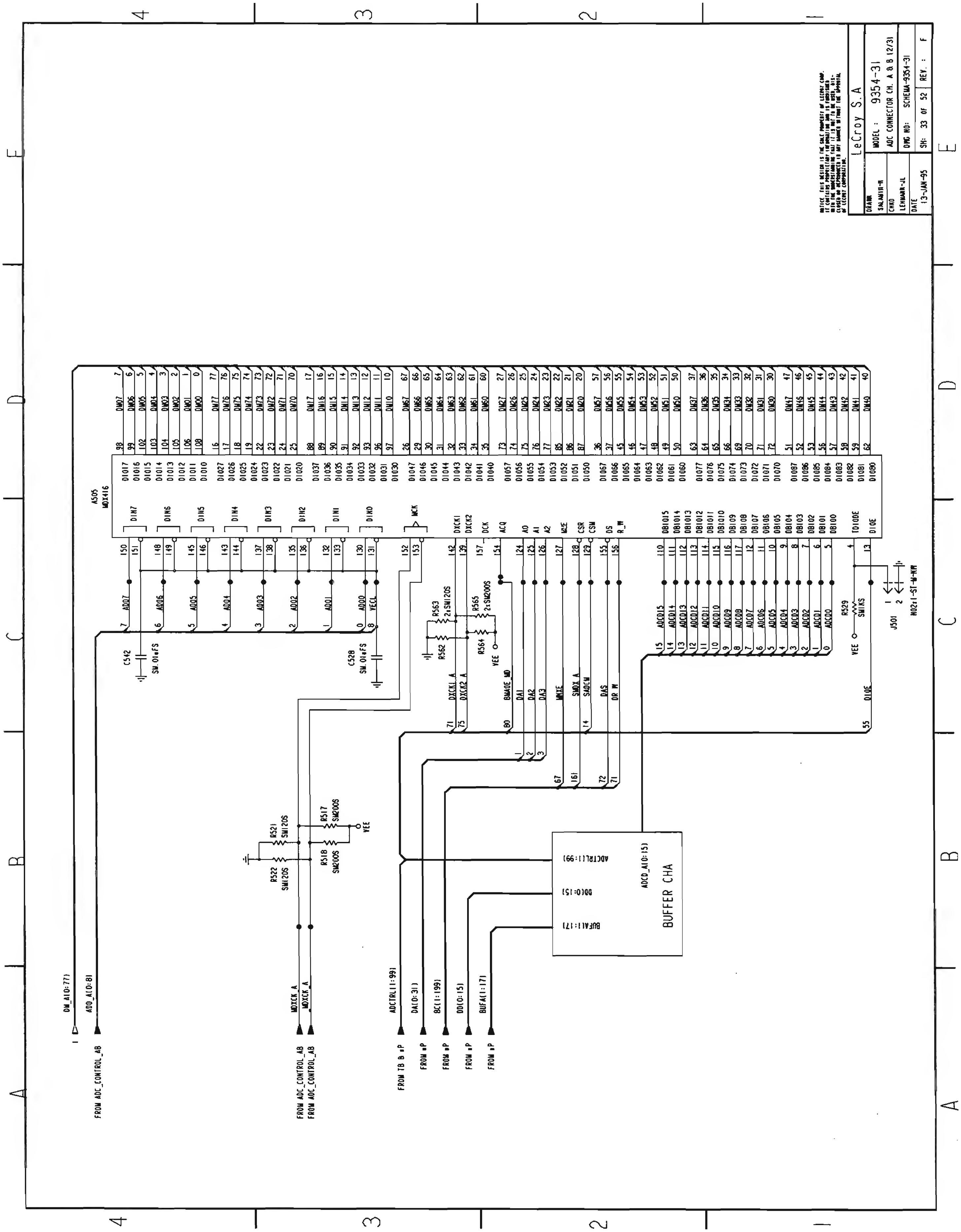

LeCroy S.A
9354-31
ADC CHA
ADC CHB
13-JAN-95

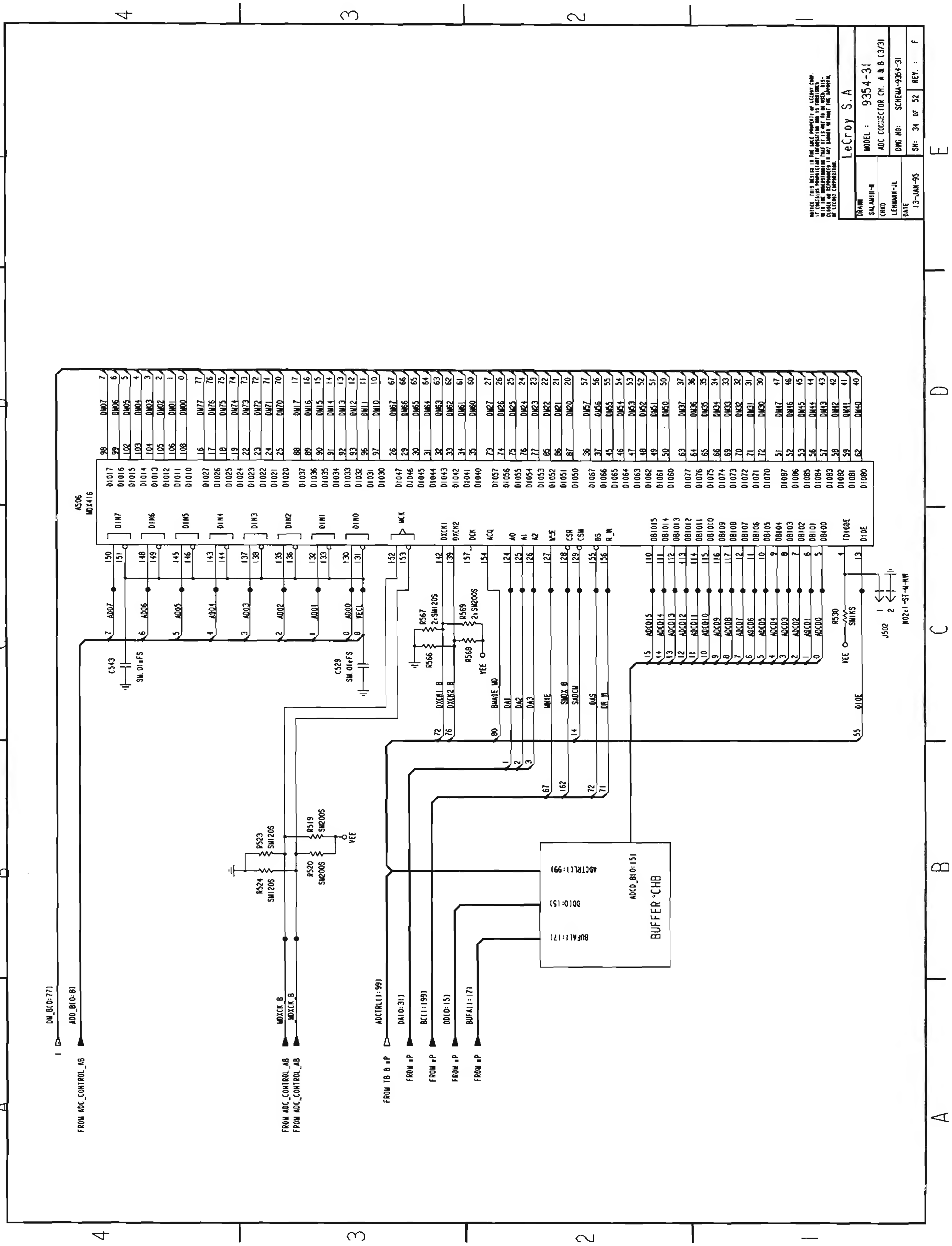


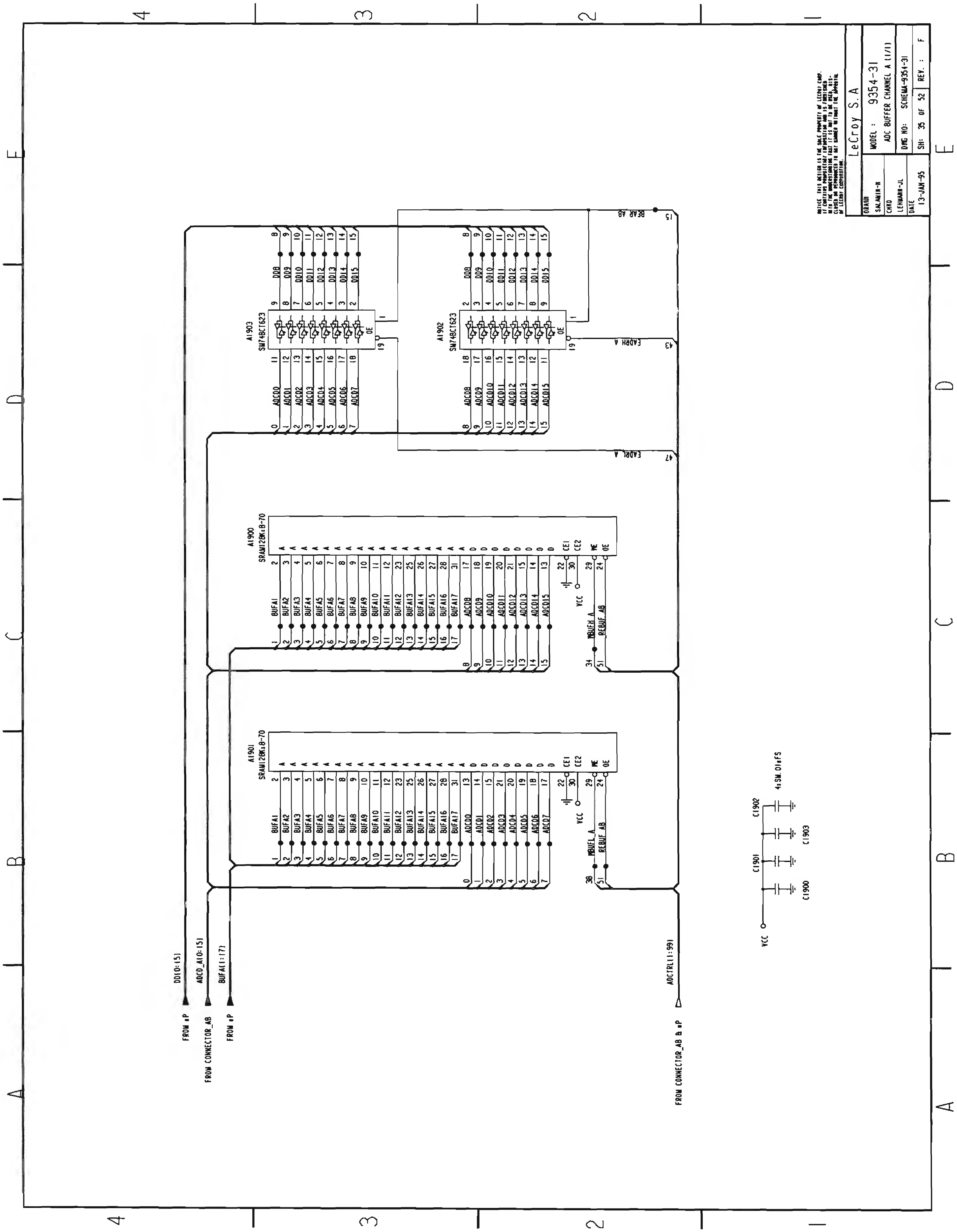
NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM
LeCroy S.A
MODEL : 9354-31
ADC CHANNEL A (1/1)
DWG NO: SCHEMA-9354-31
SH: 30 OF 52
DATE 13-JAN-95

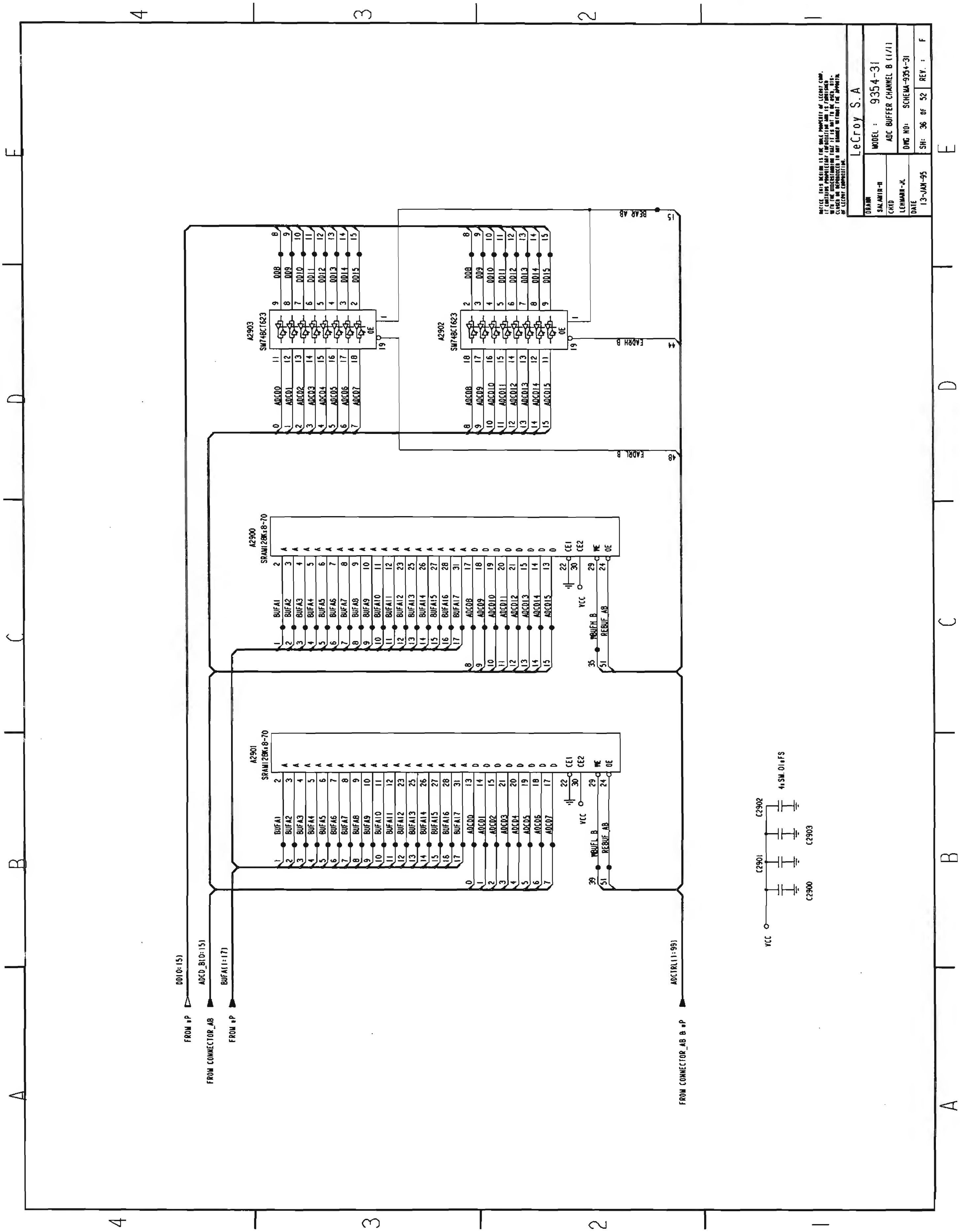

LeCroy S.A
MODEL: 9354-31
ADC CHANNEL B (1/1)
DWG NO: SCHEMA-9354-31
SH: 31 OF 52
REV.: F
DATE 13-JAN-95
NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM
A2500 HSH416
FROM FE
ADCIN_B
FROM ADC_CONTROL_AB
TO ADC_CONNECTOR_AB

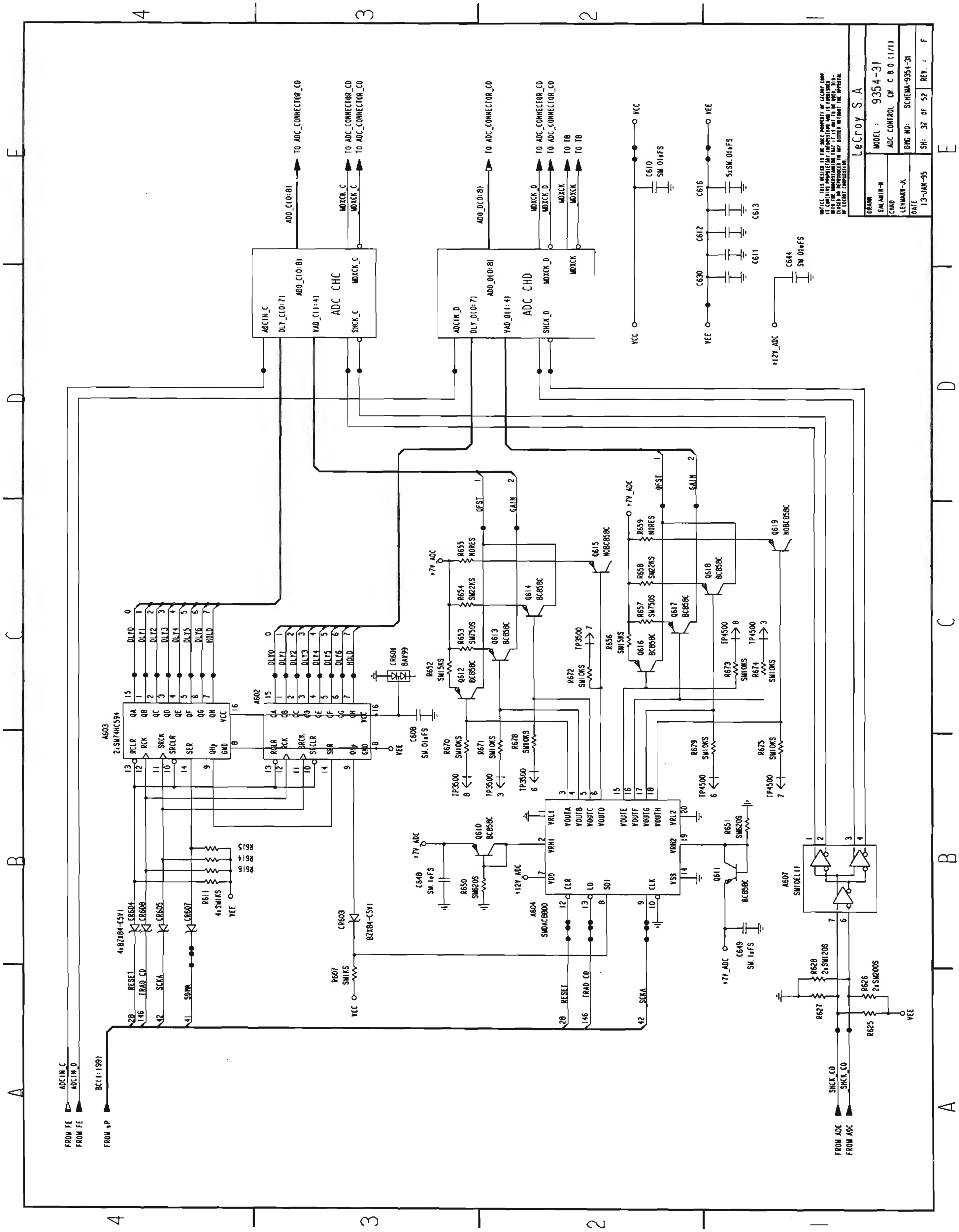


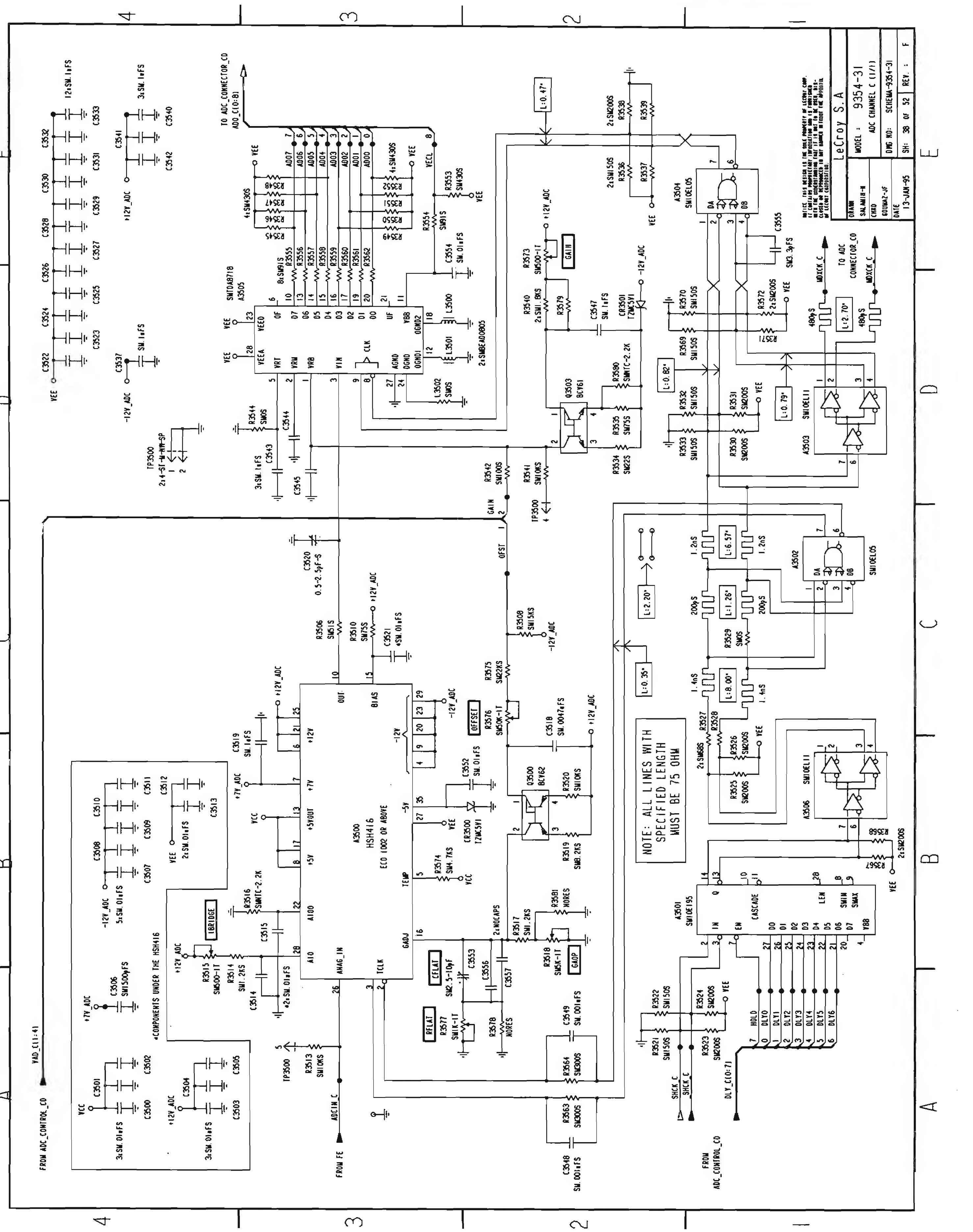

LeCroy S.A
MODEL : 9354-31
ADC CONNECTOR CH. A & B (2/3)
DWG NO: SCHEMA-9354-31
SH: 33 of 52
REV. : F
13-JAN-95
BUFFER CHA
MDX416

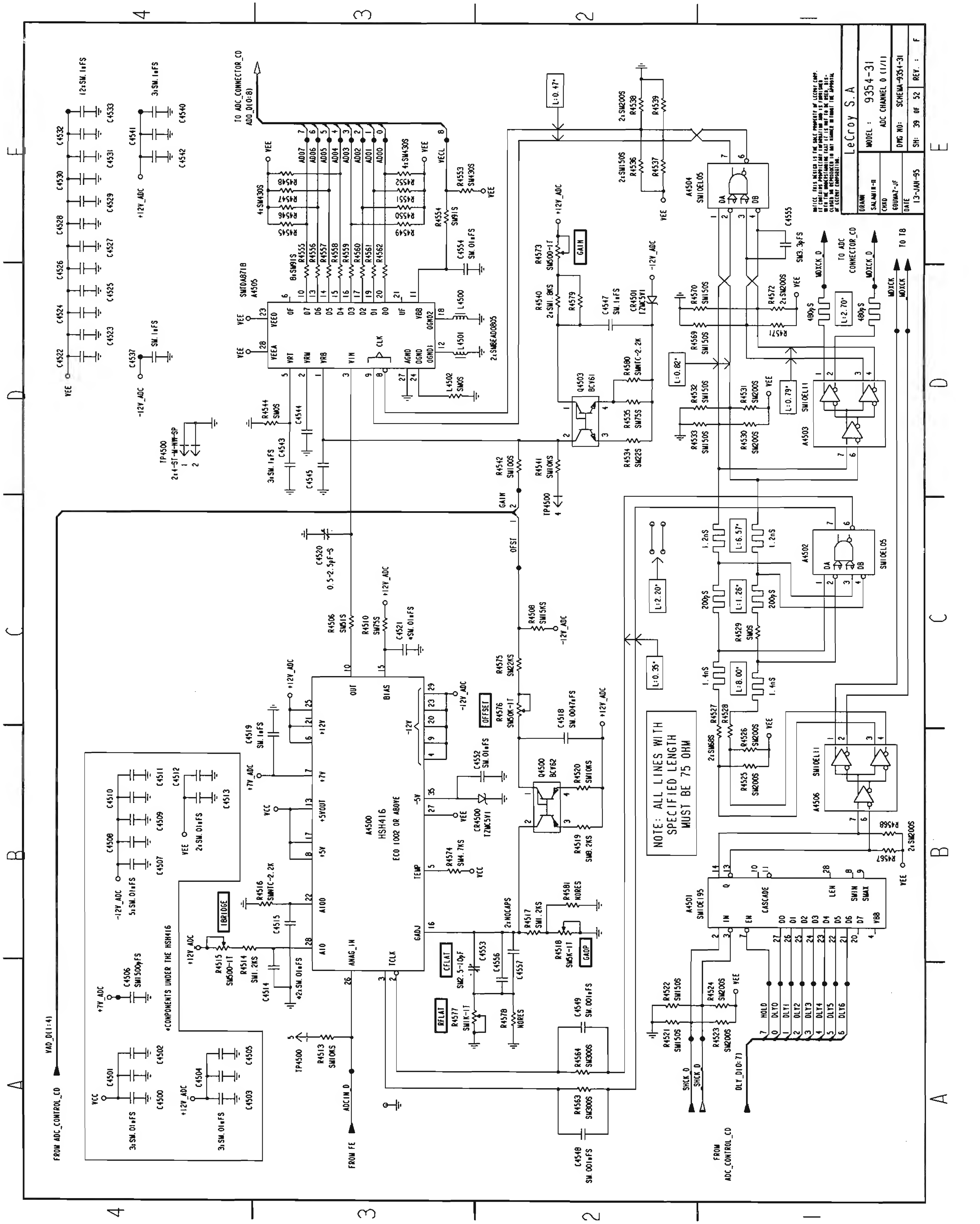

LeCroy S.A
MODEL : 9354-31
ADC CONNECTOR CH. A & B (3/3)
DWG NO: SCHEMA-9354-31
SH: 34 OF 52
REV. : F
DRAWN SALAMIN-M
CHKD LEHMANN-JL
DATE 13-JAN-95
BUFFER CHB

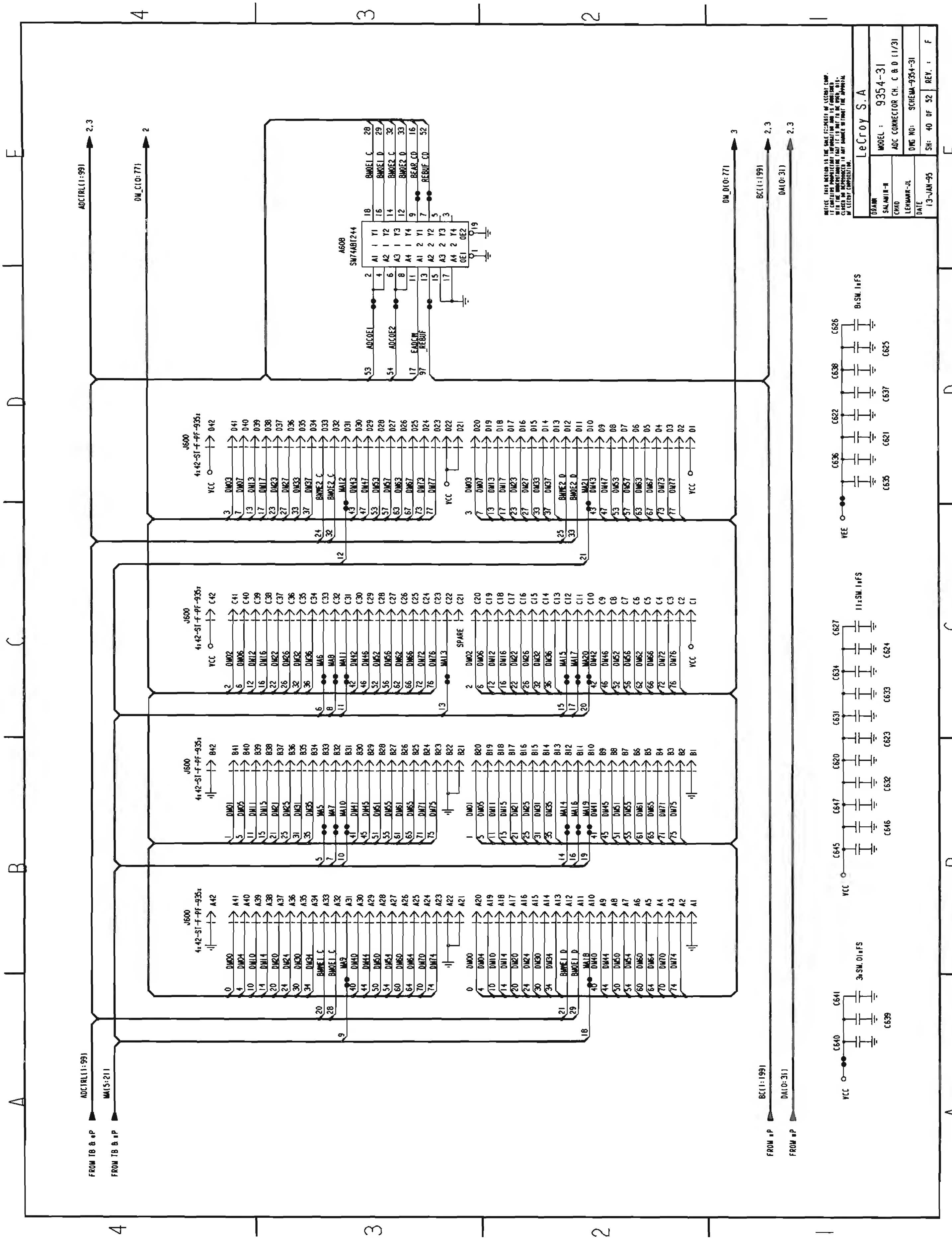

LeCroy S.A
MODEL : 9354-31
ADC BUFFER CHANNEL A (1/1)
DWG NO: SCHEMA-9354-31
SH: 35 OF 52
REV. : F
13-JAN-95
A1903 SN74BCT623
A1902 SN74BCT623
A1900 SRAM128Kx8-70
A1901 SRAM128Kx8-70
FROM μP
FROM CONNECTOR_AB
FROM CONNECTOR_AB & μP

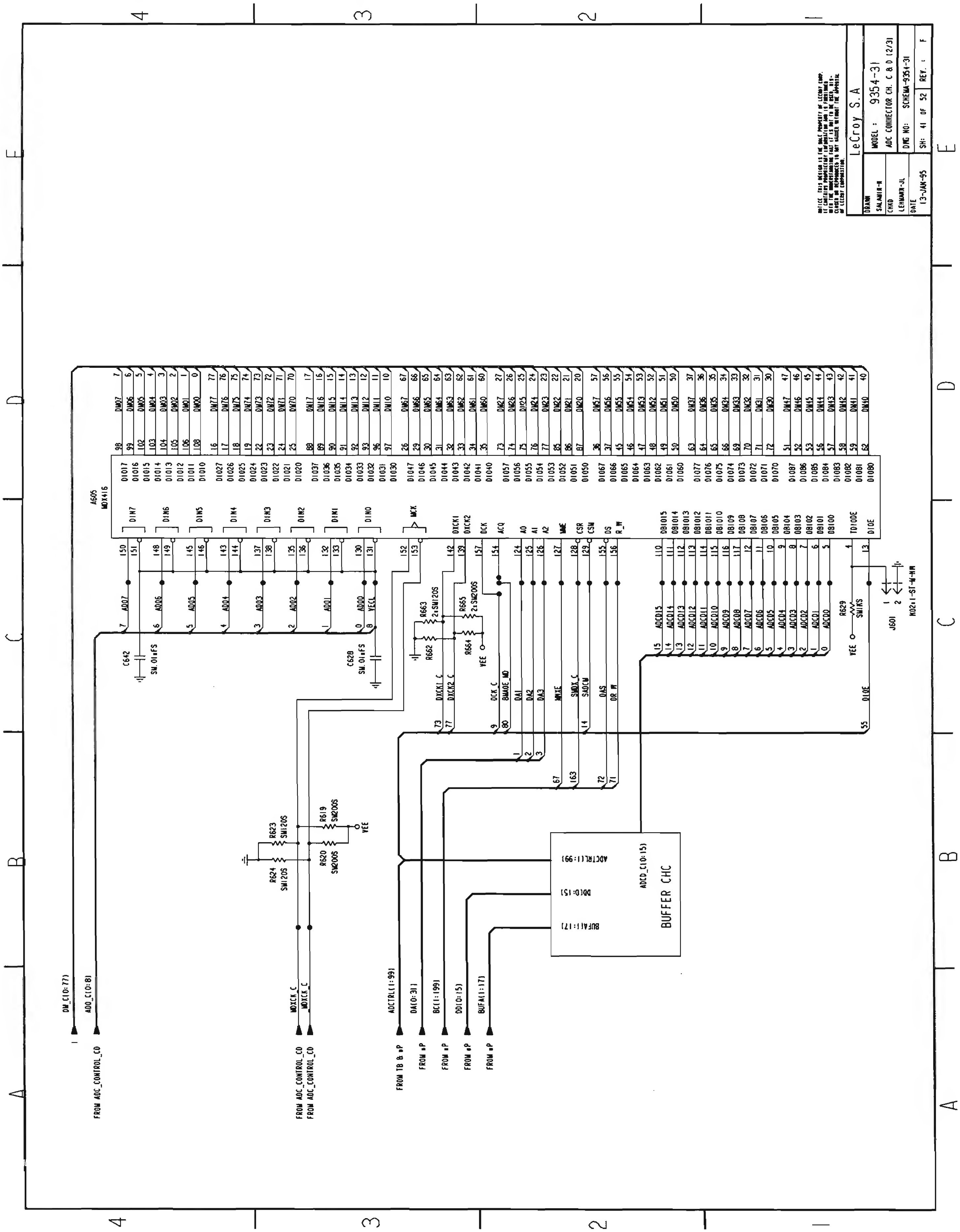

LeCroy S.A
MODEL : 9354-31
ADC BUFFER CHANNEL B (1/1)
DWG NO: SCHEMA-9354-31
SH: 36 OF 52
REV. : F
DATE 13-JAN-95
A2903 SN74BCT623
A2902 SN74BCT623
A2900 SRAM128Kx8-70
A2901 SRAM128Kx8-70
FROM µP
FROM CONNECTOR_AB
FROM CONNECTOR_AB & µP

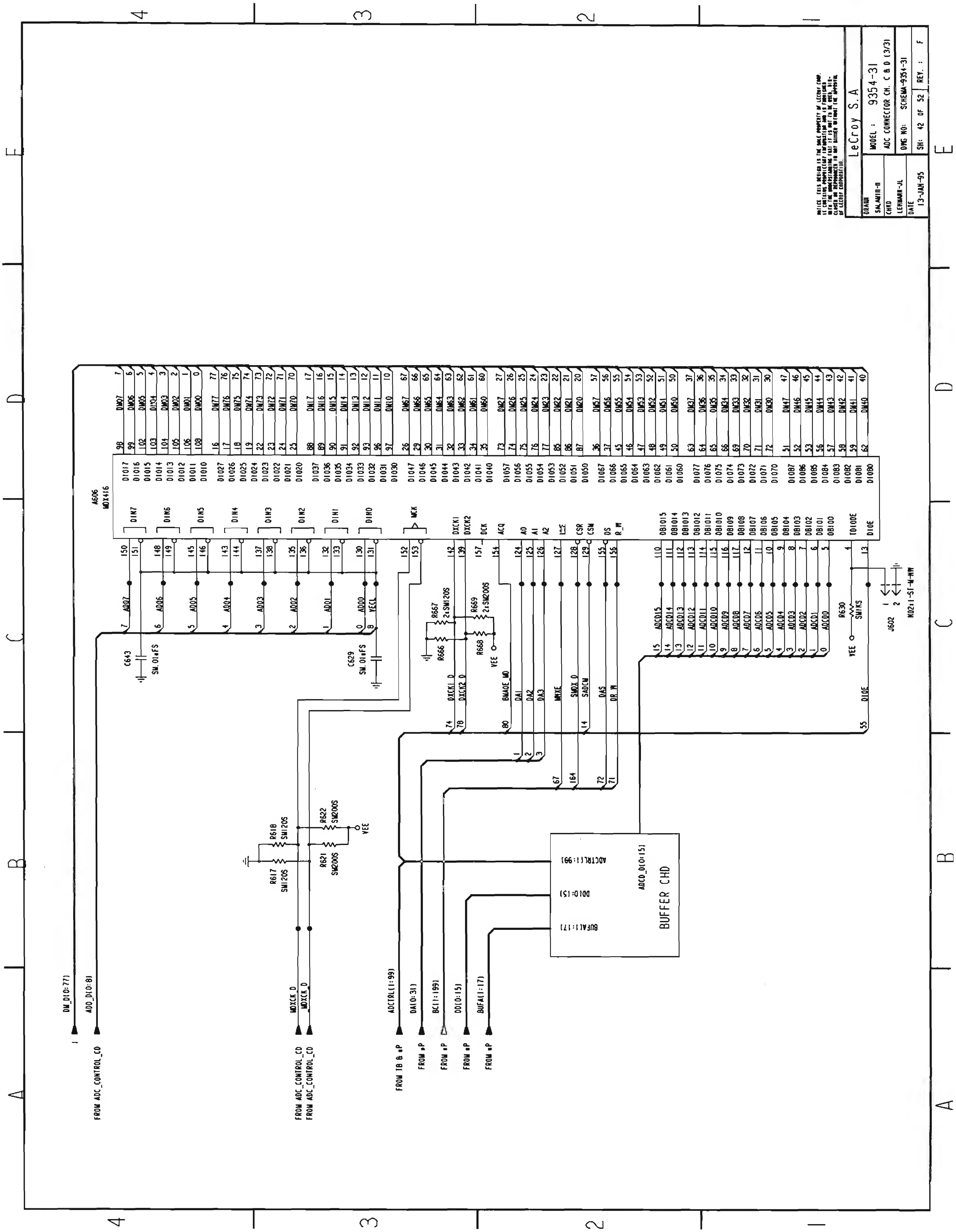

LeCroy S.A
MODEL : 9354-31
ADC CONTROL CH. C & D (1/1)
DWG NO: SCHEMA-9354-31
SH: 37 OF 52
REV. : F
DATE 13-JAN-95
ADC CHC
ADC CHD
TO ADC_CONNECTOR_CD
TO TB
FROM FE
FROM uP
FROM ADC

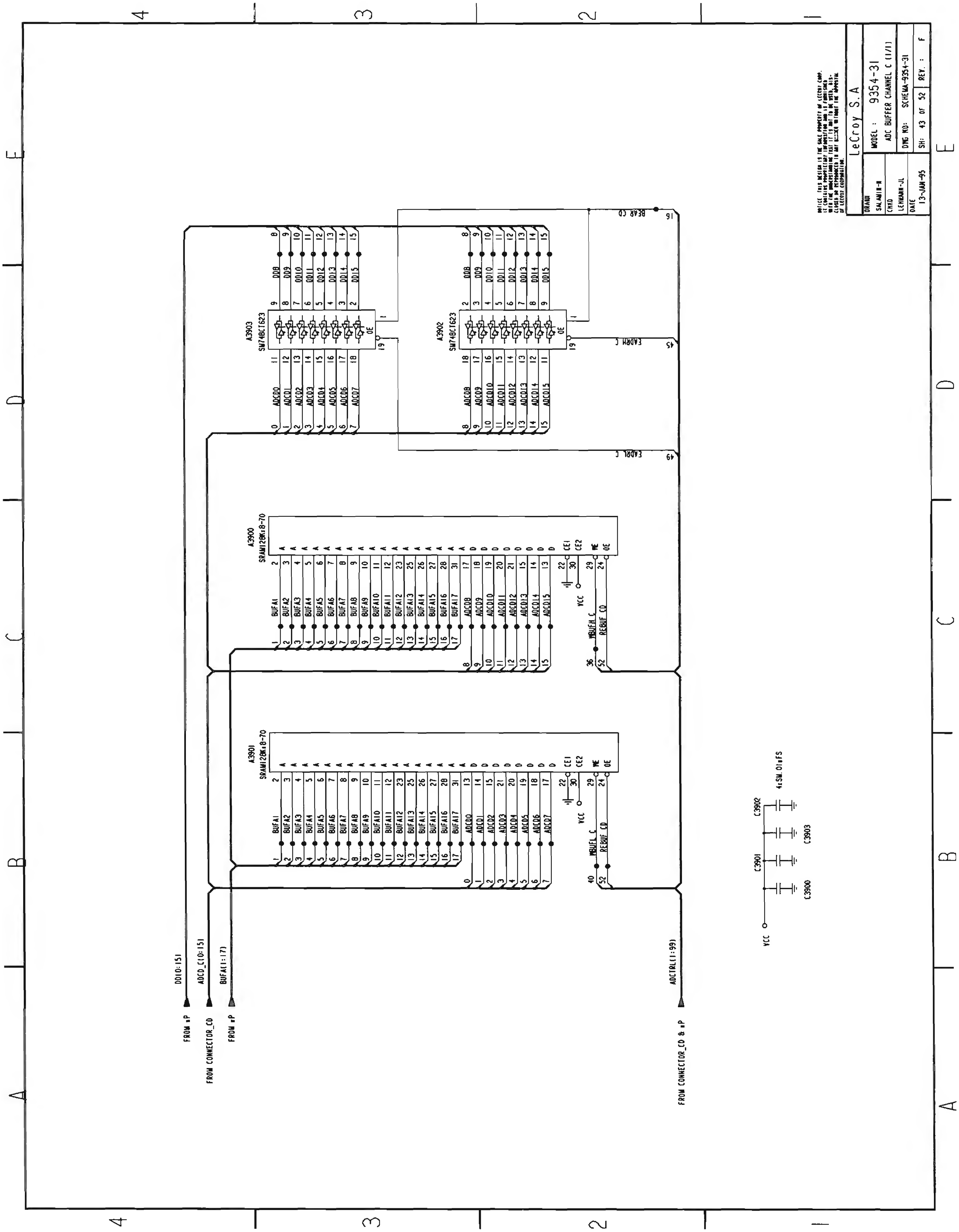

NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM
LeCroy S.A
MODEL : 9354-31
ADC CHANNEL C (1/1)
DWG NO: SCHEMA-9354-31
SH: 38 OF 52
REV. : F
13-JAN-95

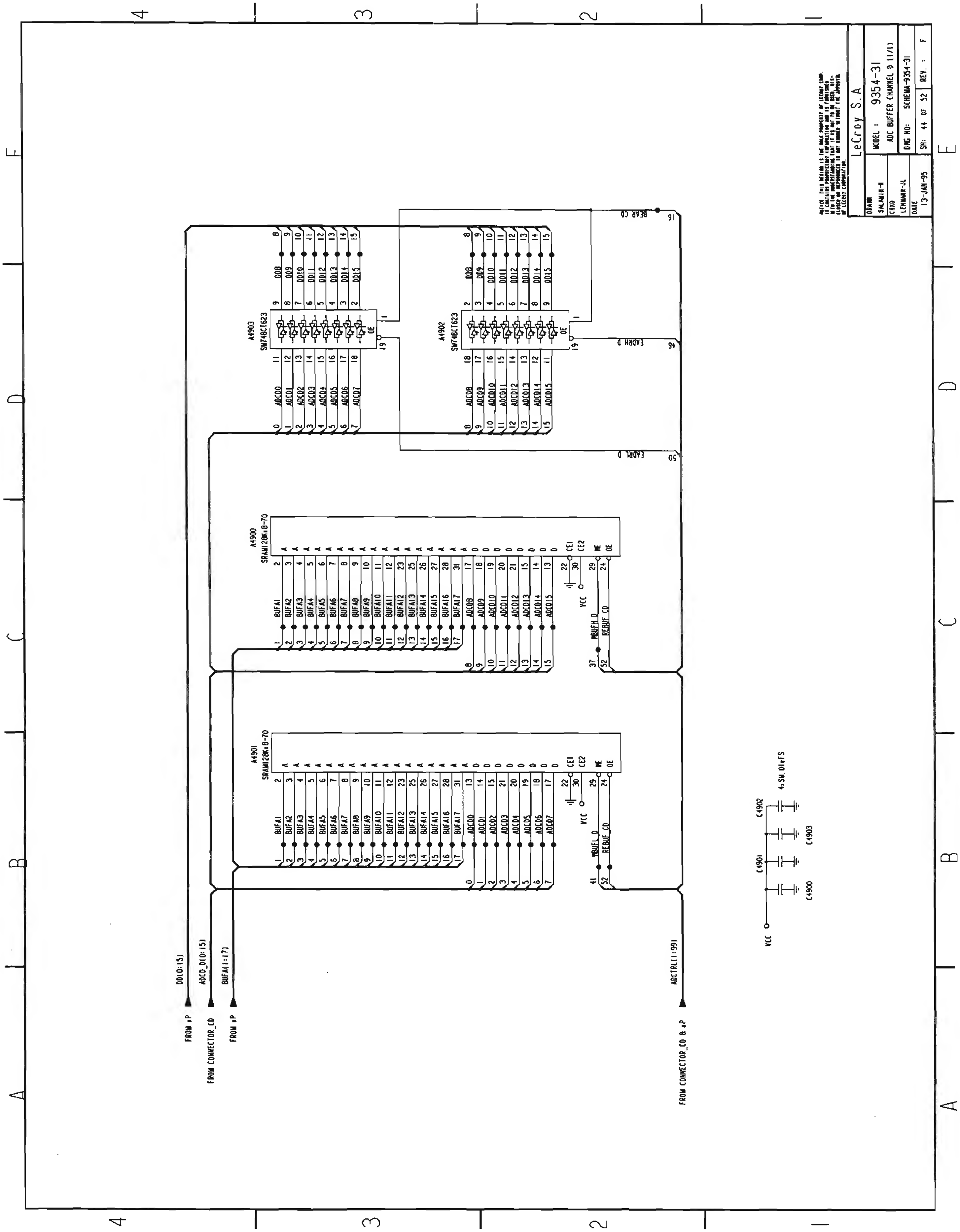

LeCroy S.A
MODEL : 9354-31
ADC CHANNEL 0 (1/1)
DWG NO: SCHEMA-9354-31
SH: 39 OF 52
REV. : F
DRAWN SALAMIN-M
CHKD GOUMAZ-JF
DATE 13-JAN-95
NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM

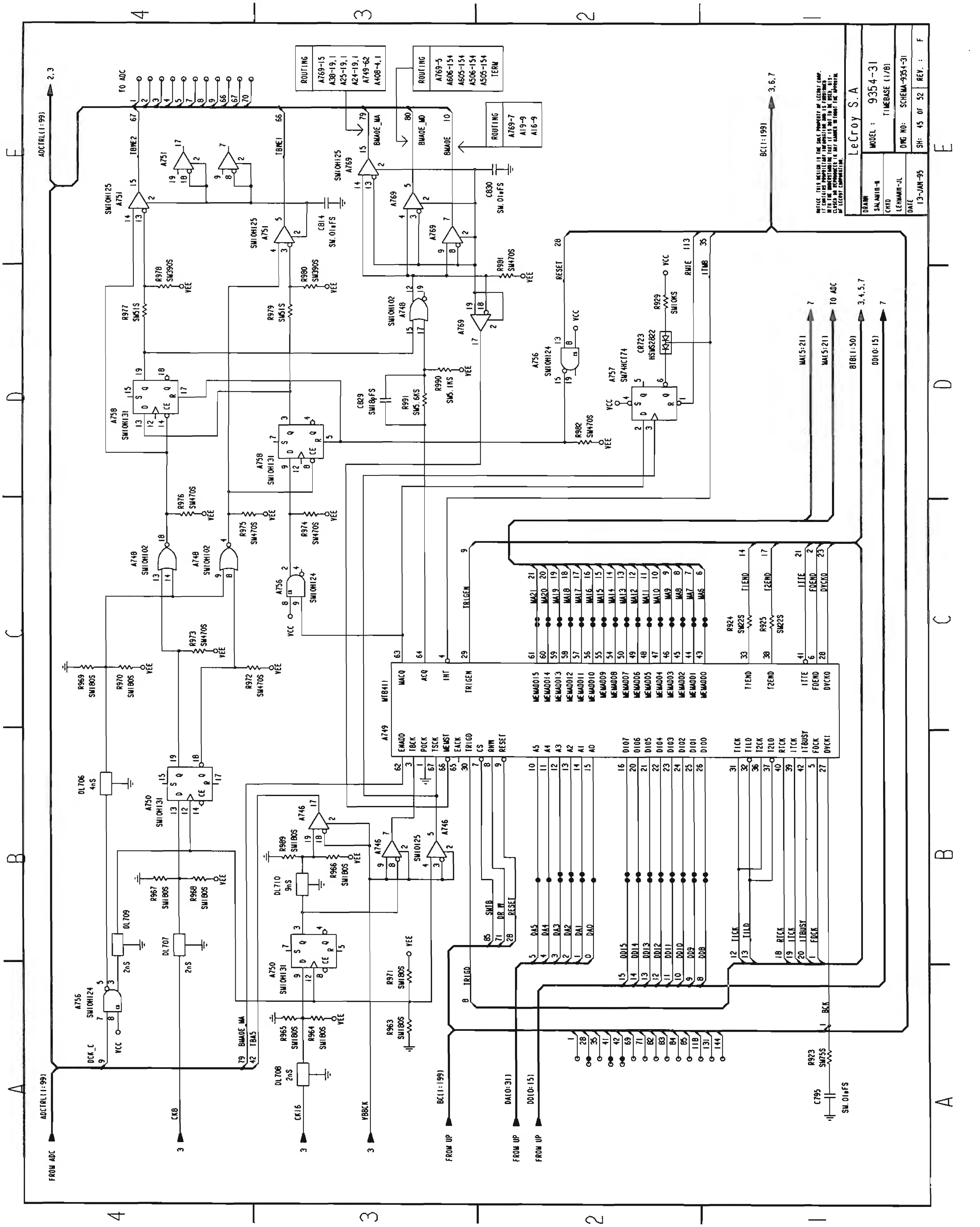

LeCroy S.A
MODEL : 9354-31
ADC CONNECTOR CH. C & D (1/3)
DWG NO: SCHEMA-9354-31
SH: 40 OF 52
REV. : F
DRAWN SALAMIN-H
CHKD LEHMANN-JL
DATE 13-JAN-95

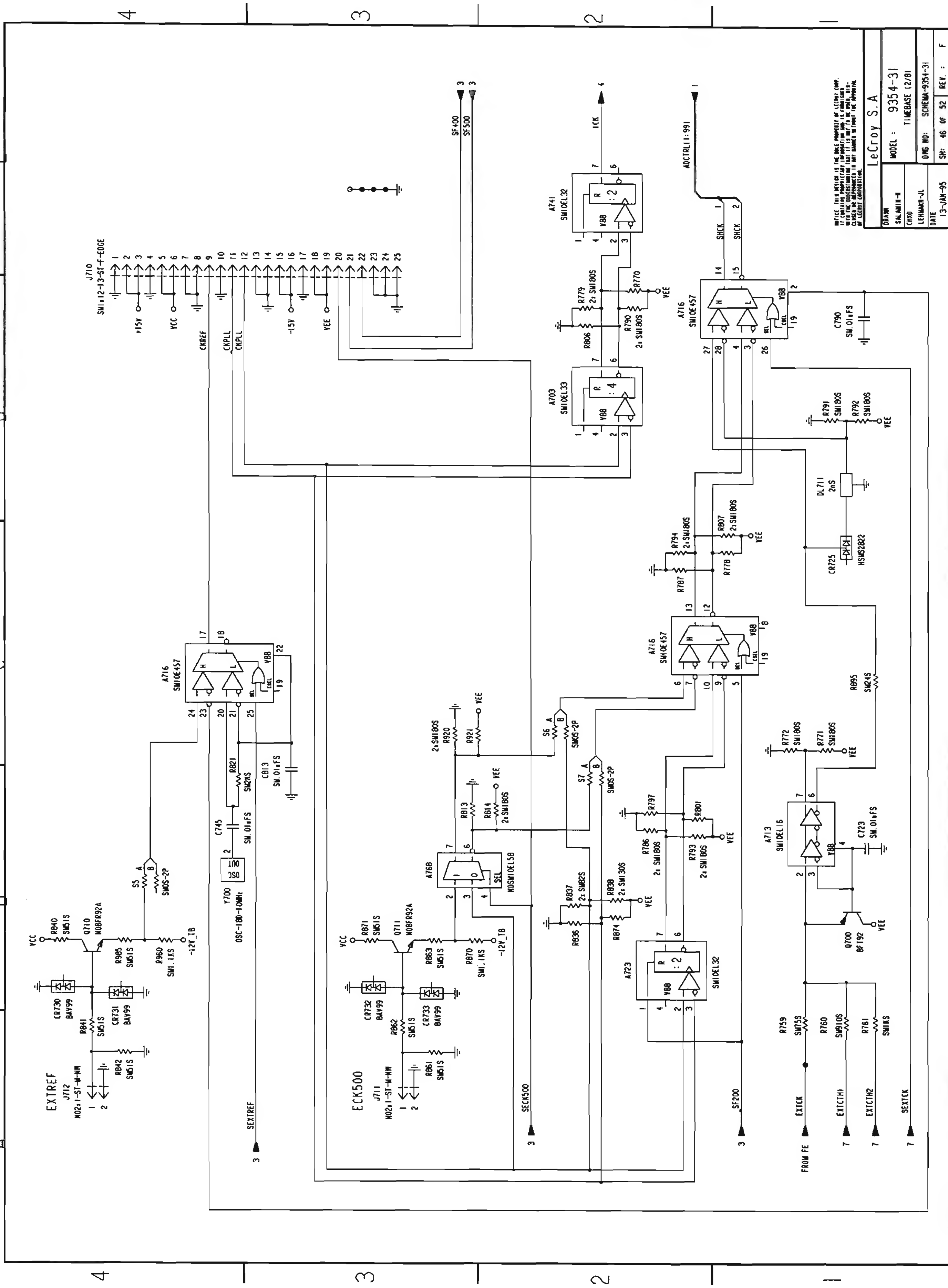

LeCroy S.A
9354-31
BUFFER CHC

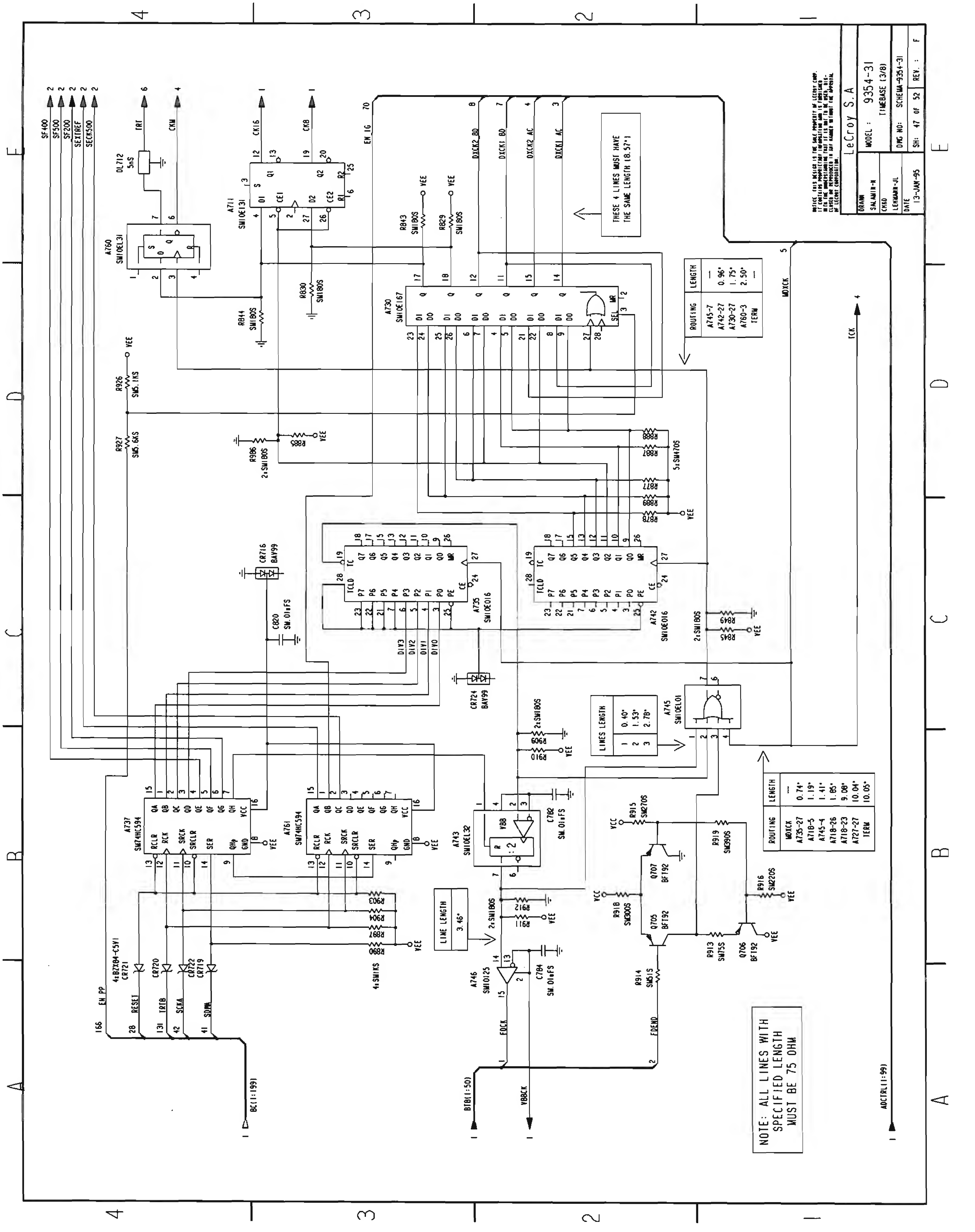

LeCroy S.A
MODEL : 9354-31
ADC CONNECTOR CH. C & D (3/3)
DWG NO: SCHEMA-9354-31
SH: 42 OF 52
REV. : F
DRAWN SALAMIN-R
CHKD LEHMANN-JL
DATE 13-JAN-95
BUFFER CHD

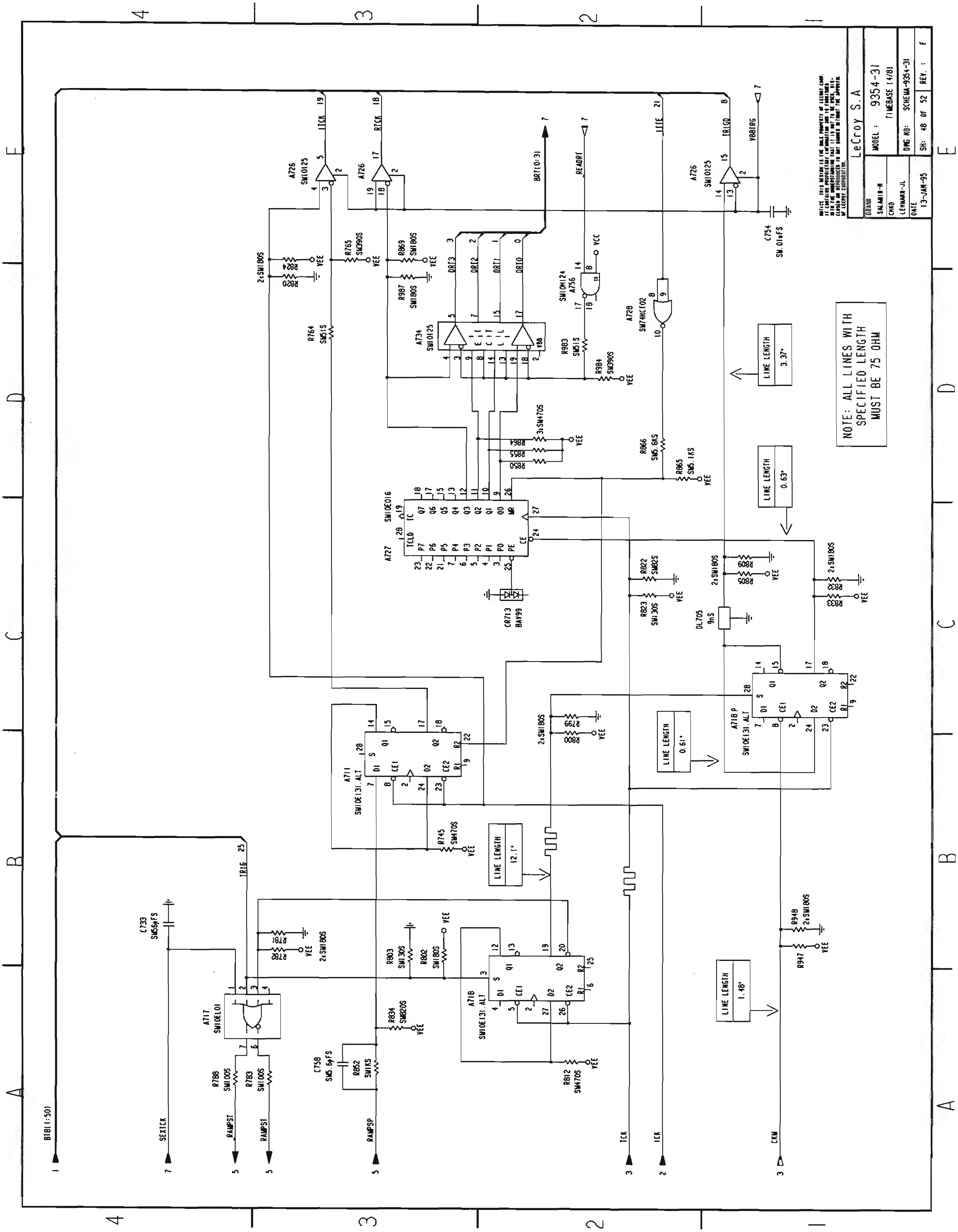


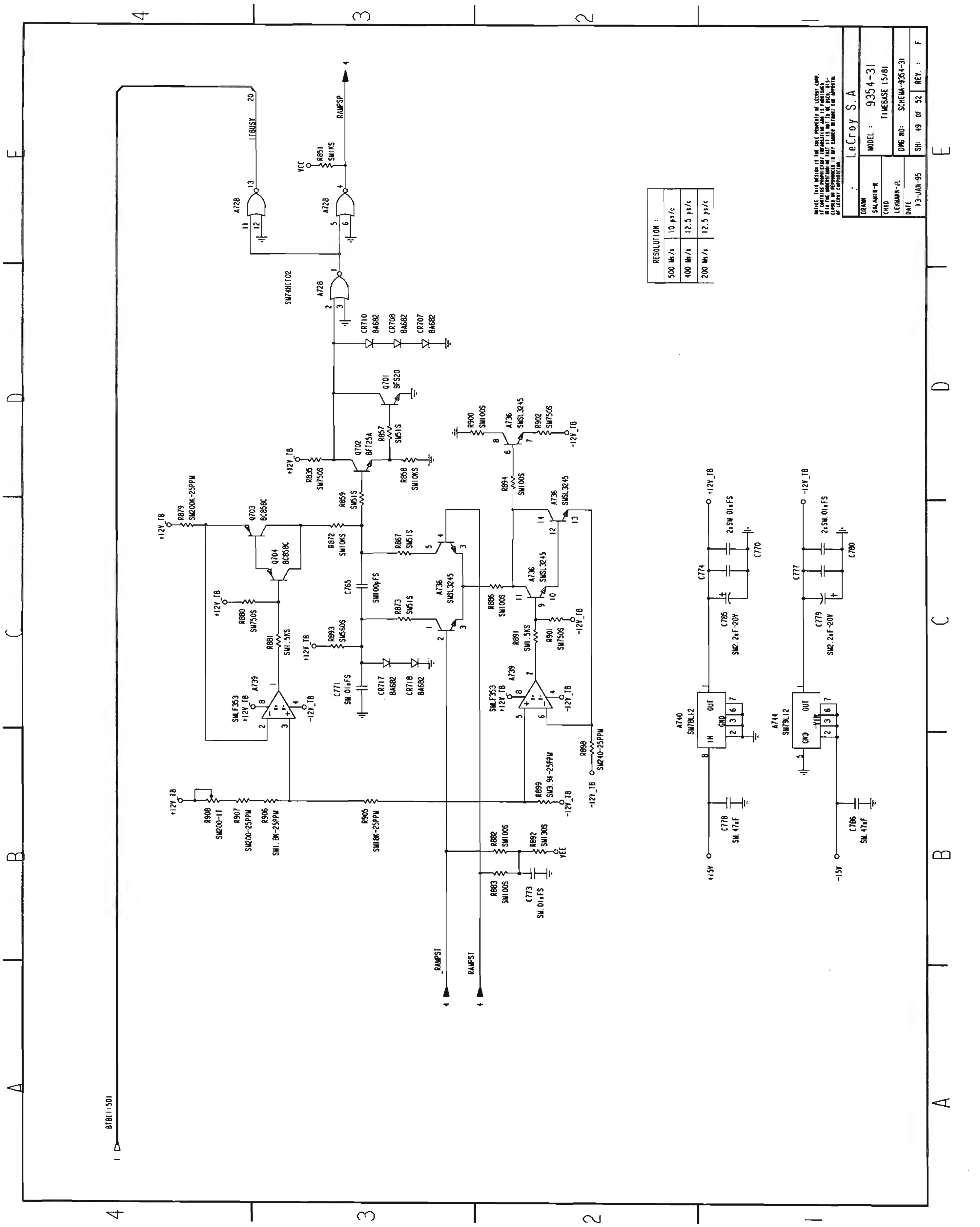


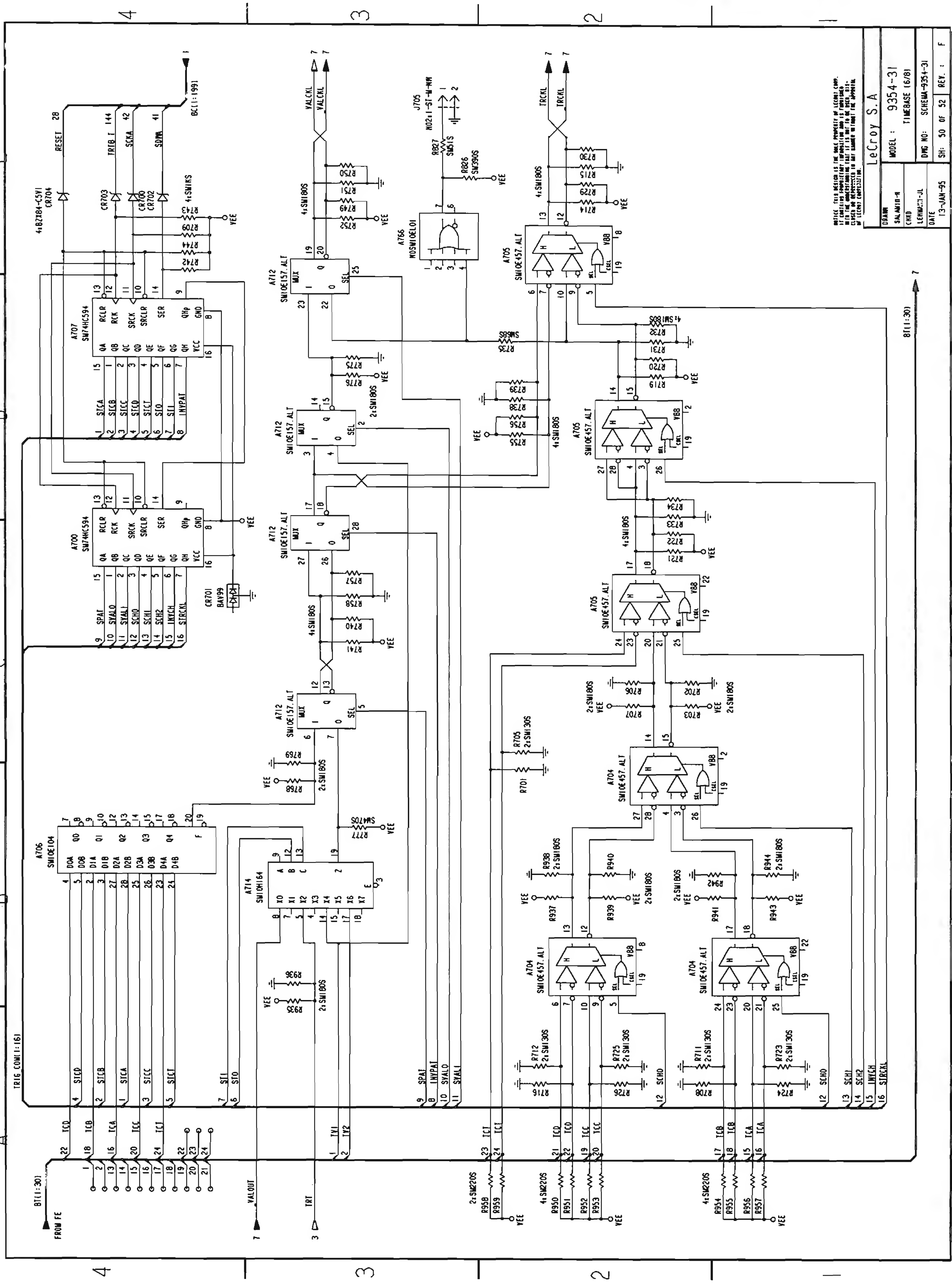

LeCroy S.A
MODEL : 9354-31
TIMEBASE (1/8)
DWG NO: SCHEMA-9354-31
SH: 45 OF 52
REV.: F
DATE 13-JAN-95
MTB411
FROM ADC
FROM UP

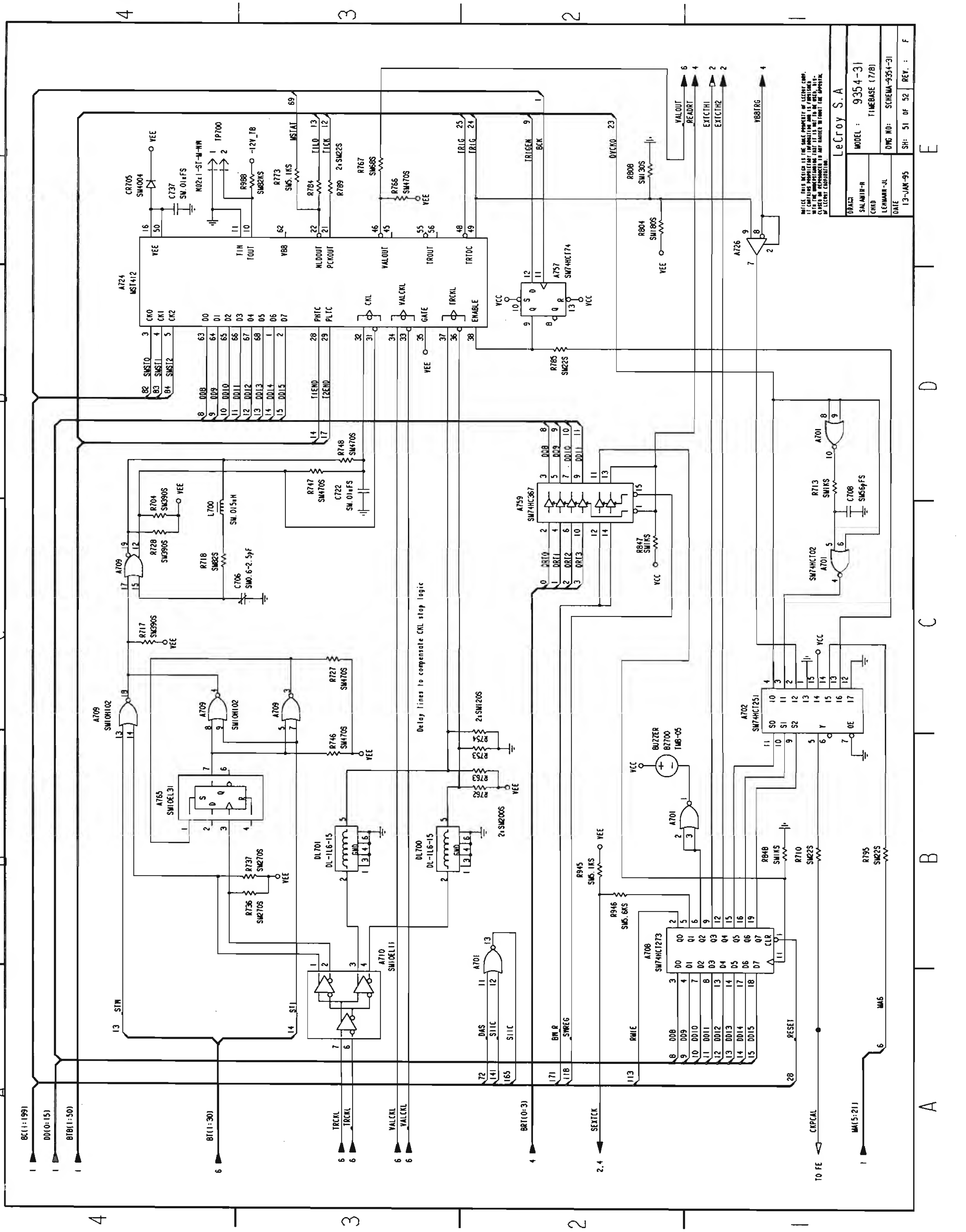

LeCroy S.A
MODEL : 9354-31
TIMEBASE (2/8)
DRAWN SALAMIN-M
CHKD LEHMANN-JL
DATE 13-JAN-95
DWG NO: SCHEMA-9354-31
SH: 46 OF 52
REV. : F
EXTREF
ECK500

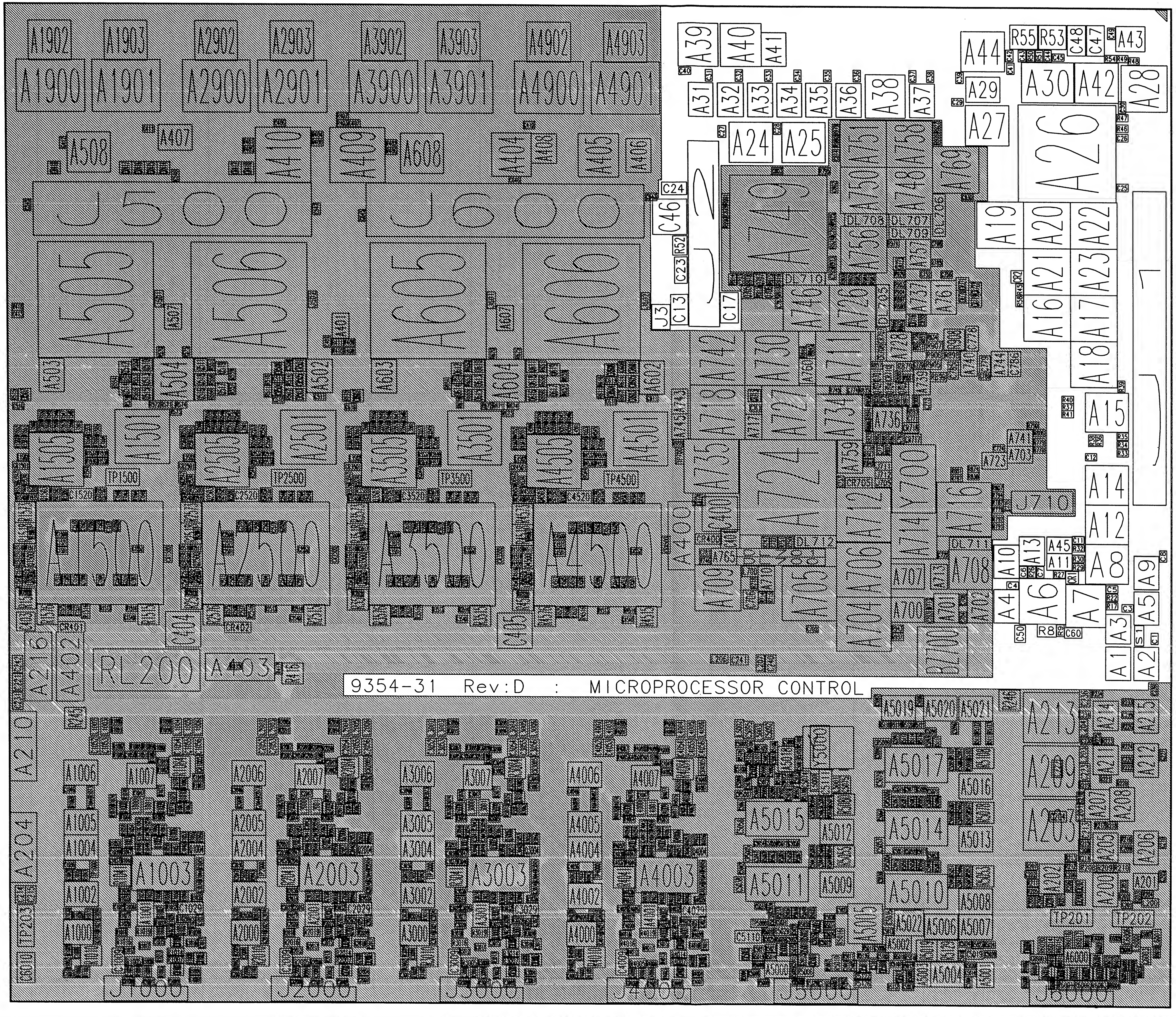

LeCroy S.A
MODEL : 9354-31
TIMEBASE (3/8)
DWG NO: SCHEMA-9354-31
SH: 47 OF 52
DATE 13-JAN-95
THESE 4 LINES MUST HAVE THE SAME LENGTH (8.57")
NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM


NOTE: ALL LINES WITH
SPECIFIED LENGTH
MUST BE 75 OHM
LeCroy S.A
9354-31
TIMEBASE (4/8)
SCHEMA-9354-31
13-JAN-95

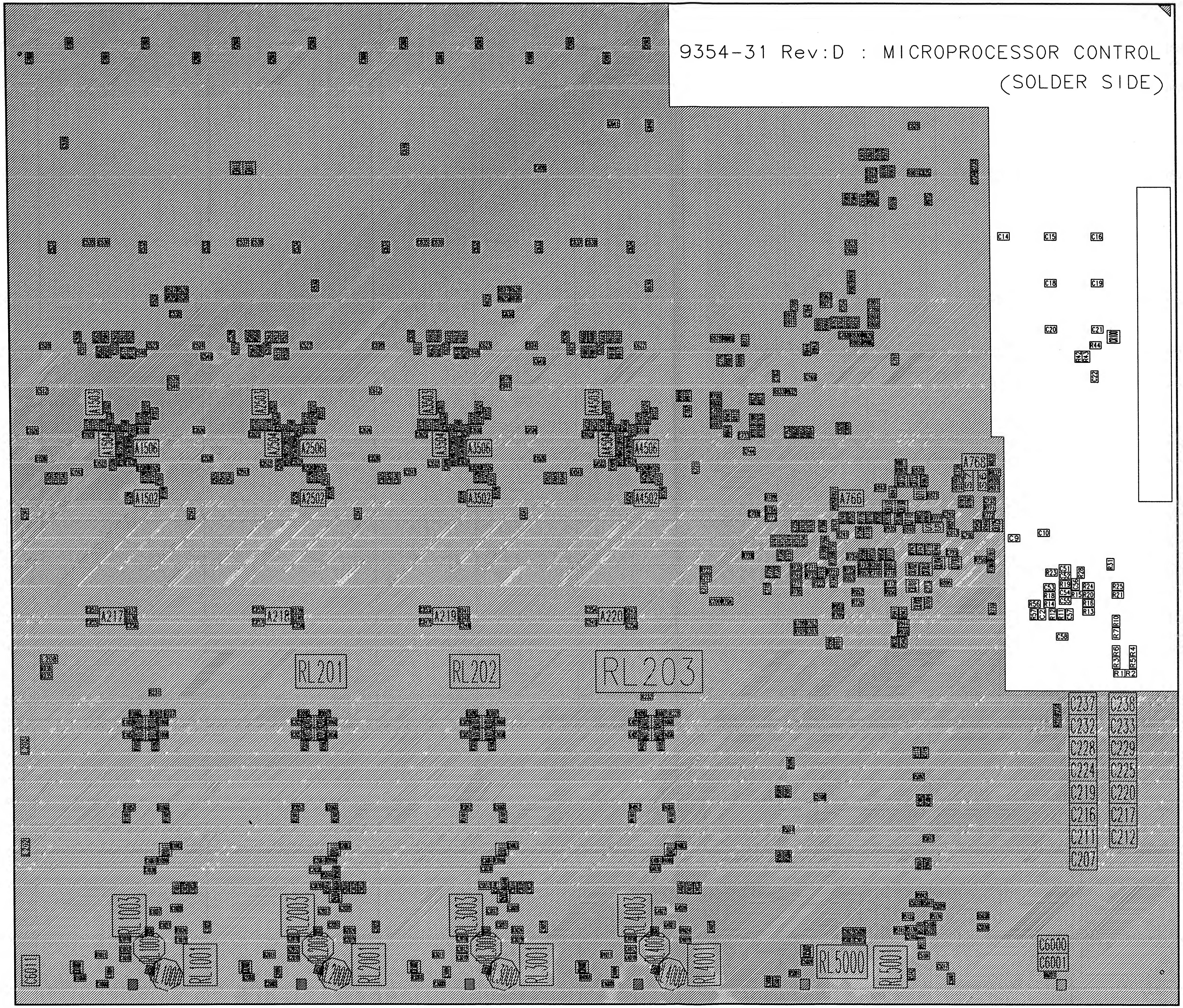

LeCroy S.A
MODEL : 9354-31
TIMEBASE (5/8)
DWG NO: SCHEMA-9354-31
SH: 49 OF 52
REV. : F
DATE 13-JAN-95
RESOLUTION :
500 Ms/s 10 ps/c
400 Ms/s 12.5 ps/c
200 Ms/s 12.5 ps/c
RAMPSP
RAMPST
_RAMPST
ITBUSY
+12V_TB
-12V_TB
+15V
-15V

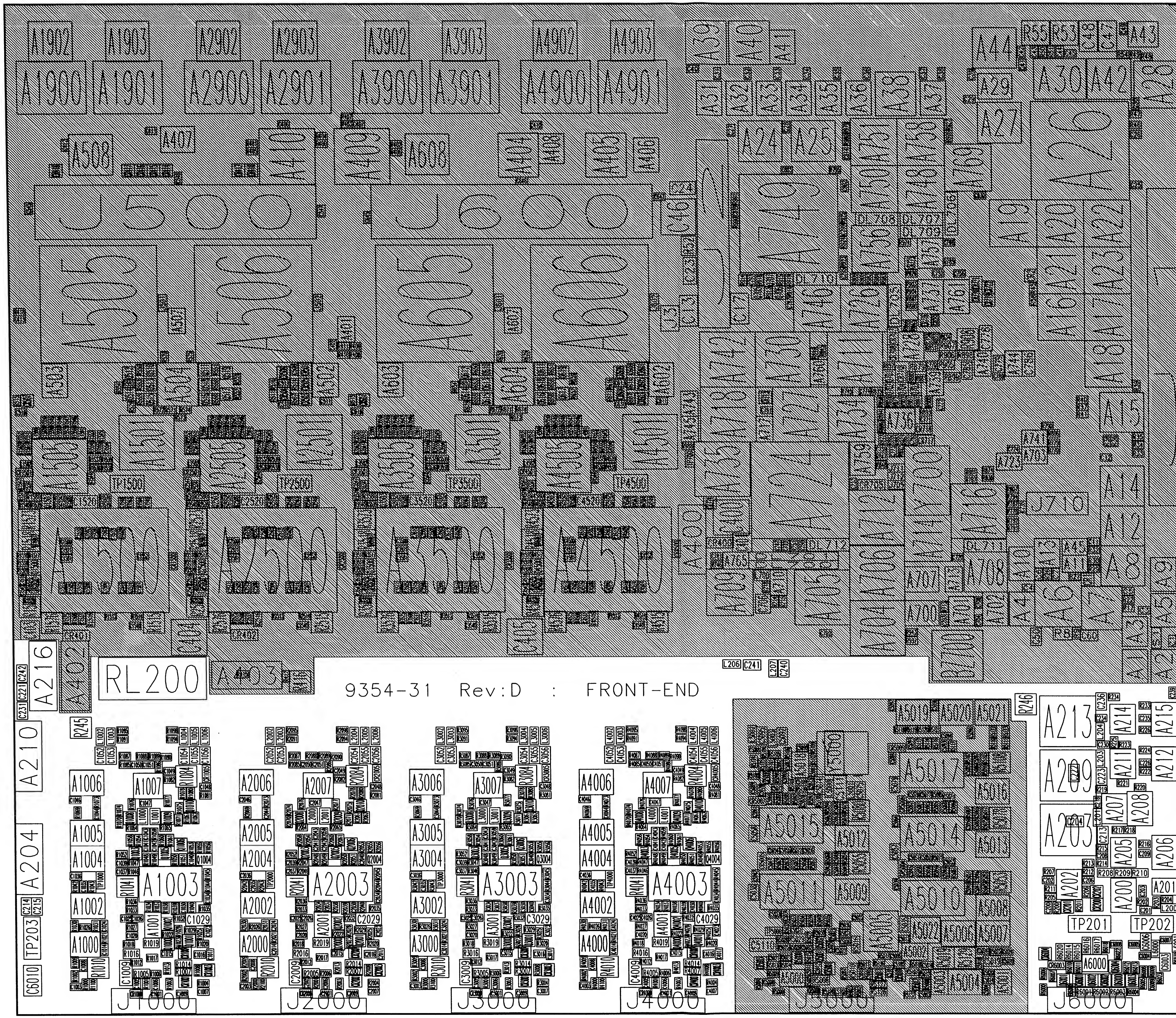

LeCroy S.A
MODEL : 9354-31
TIMEBASE (6/8)
DWG NO: SCHEMA-9354-31
SH: 50 OF 52
REV. : F
DATE 13-JAN-95

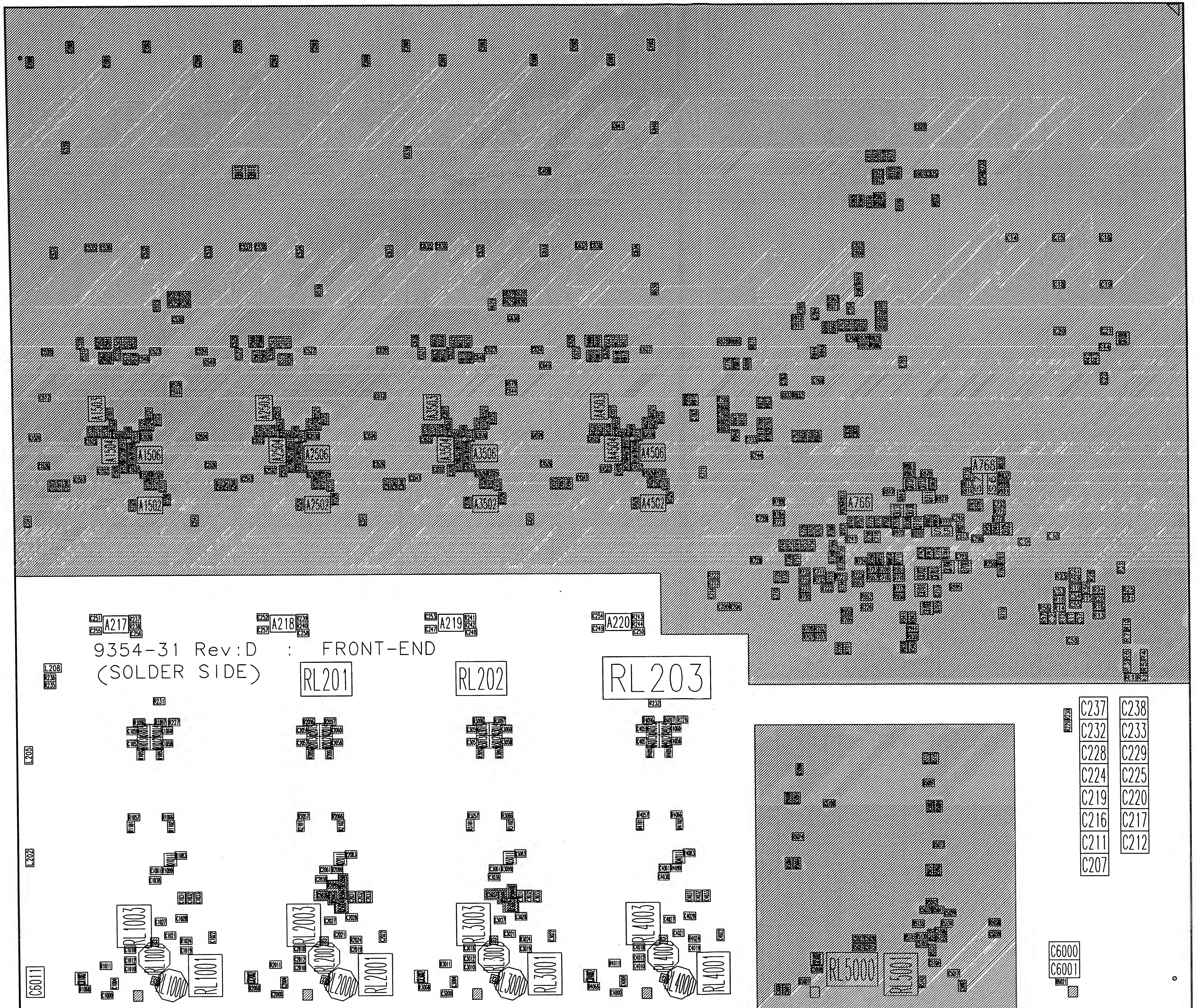

LeCroy S.A
9354-31
TIMEBASE (7/8)
13-JAN-95

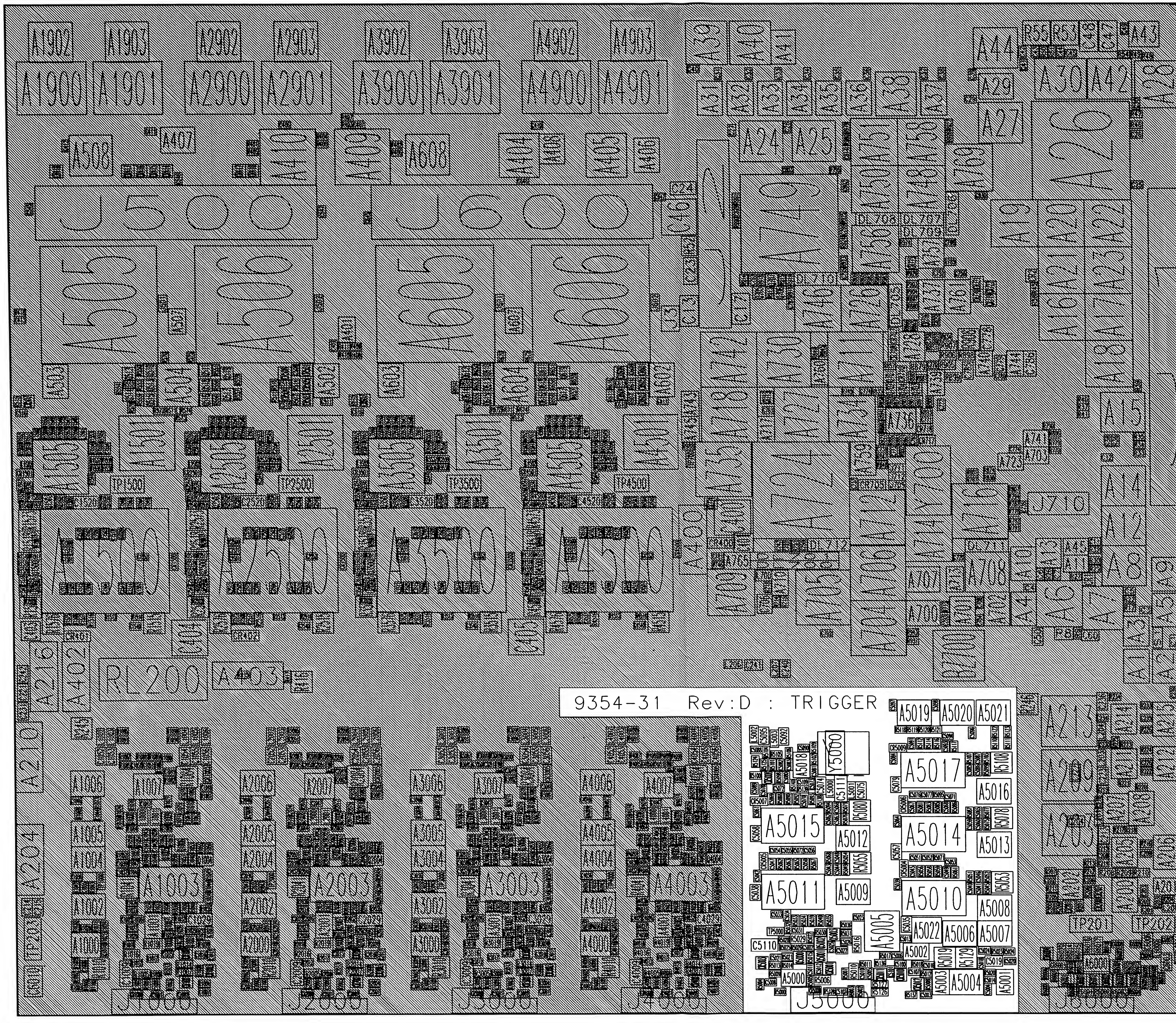

9354-31 Rev:D : MICROPROCESSOR CONTROL

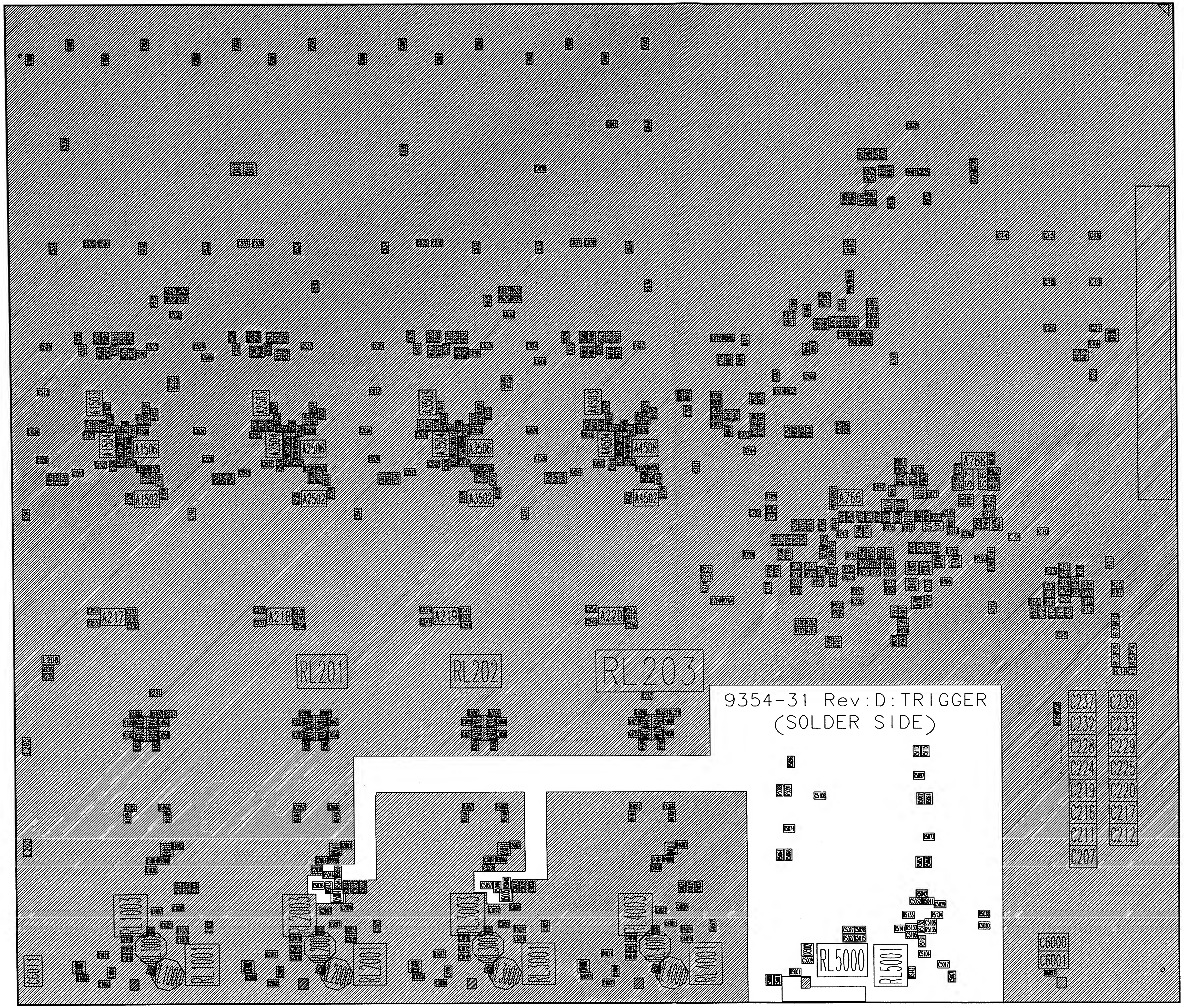
9354-31 Rev:D : MICROPROCESSOR CONTROL
(SOLDER SIDE)

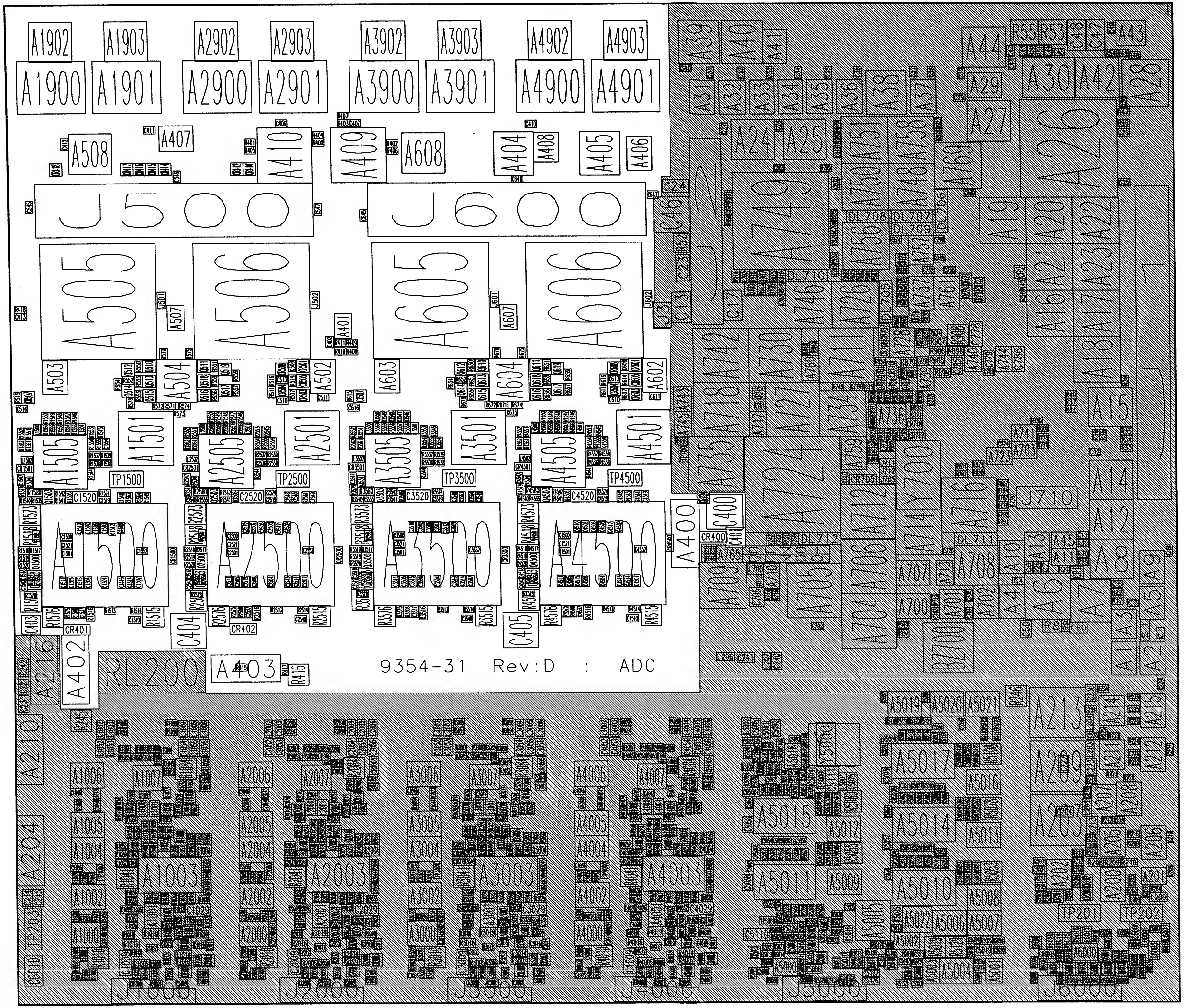


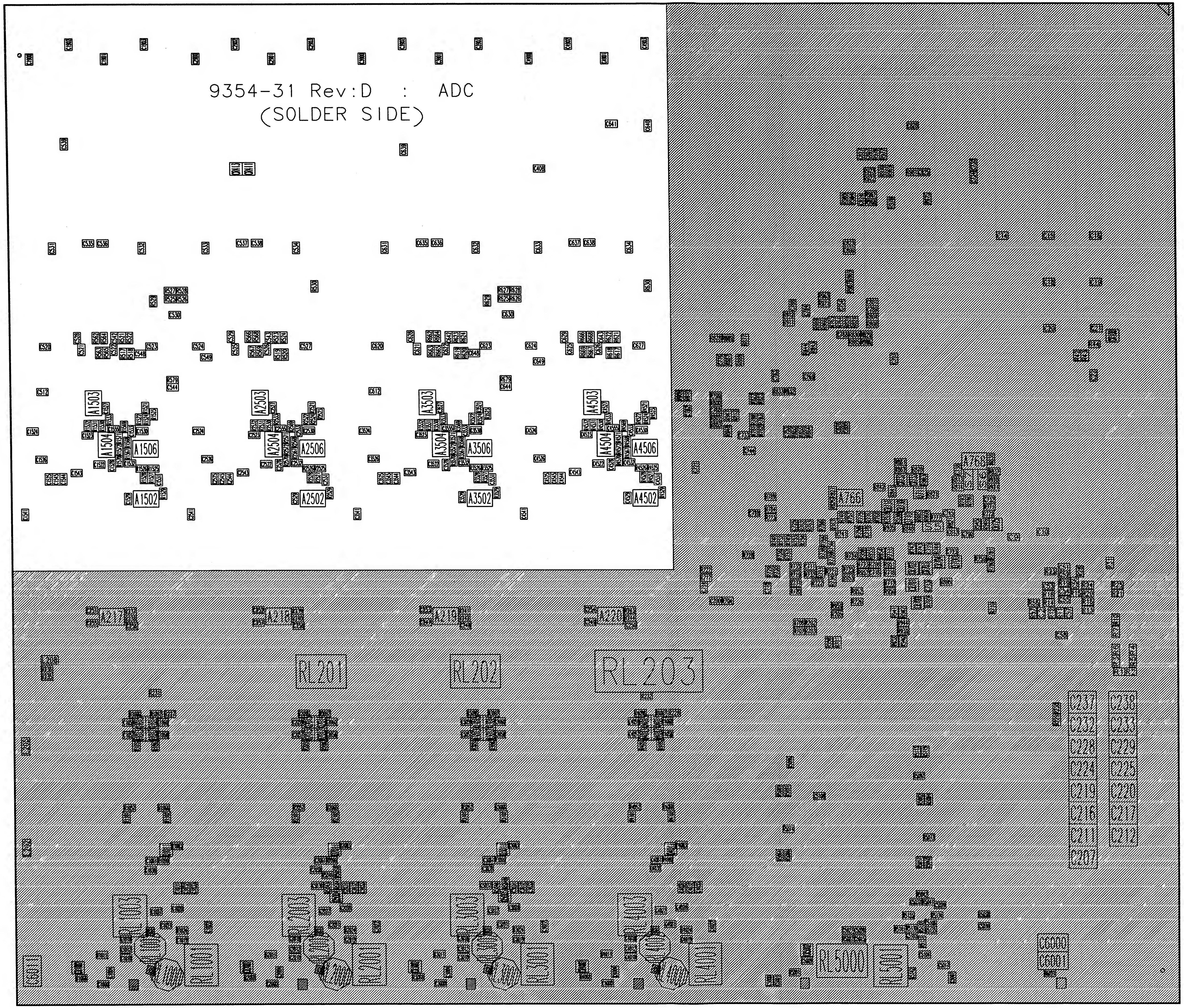

9354-31 Rev:D : FRONT-END
RL200
A216
A210
A204
TP203
C6010
R245
A402
A403
A404
A405
J500
J600
A505
A506
A605
A606
A1500
A2500
A3500
A4500
A1501
A2501
A3501
A4501
A1505
A2505
A3505
A4505
TP1500
TP2500
TP3500
TP4500
A1900
A1901
A1902
A1903
A2900
A2901
A2902
A2903
A3900
A3901
A3902
A3903
A4900
A4901
A4902
A4903
A508
A608
A407
A409
A410
A1000
A1002
A1003
A1004
A1005
A1006
A1007
A2000
A2002
A2003
A2004
A2005
A2006
A2007
A3000
A3002
A3003
A3004
A3005
A3006
A3007
A4000
A4002
A4003
A4004
A4005
A4006
A4007
J1000
J2000
J3000
J4000
J5000
J6000
A5010
A5011
A5014
A5015
A5017
A5019
A5020
A5021
A6000
A200
A201
A202
A203
A205
A206
A207
A208
A209
A211
A212
A213
A214
A215
TP201
TP202
R246
A749
A724
A742
A700
A26
A30
A42
A44
A28
A27
A29
A24
A25
A19
A20
A21
A22
A14
A15
A12
A8
A6
A7
J710
B700
DL707
DL708
DL709
DL710
DL711
DL712
L206
C241


9354-31 Rev:D : FRONT-END
(SOLDER SIDE)
A217
A218
A219
A220
RL201
RL202
RL203
C237
C238
C232
C233
C228
C229
C224
C225
C219
C220
C216
C217
C211
C212
C207
C6000
C6001
C6011
L208
L205
L202
RL1003
RL1001
RL2003
RL2001
RL3003
RL3001
RL4003
RL4001
RL5000
RL5001
A1506
A1502
A2506
A2502
A3506
A3502
A4506
A4502
A766
A768


9354-31 Rev:D : TRIGGER


9354-31 Rev:D:TRIGGER
(SOLDER SIDE)
RL201
RL202
RL203
A217
A218
A219
A220
A766
A768
C237
C238
C232
C233
C228
C229
C224
C225
C219
C220
C216
C217
C211
C212
C207
C6000
C6001
RL5000
RL5001
RL101
RL201
RL301
RL401


J500
J600
9354-31 Rev:D : ADC


9354-31 Rev:D : ADC
(SOLDER SIDE)
A1503
A1504
A1506
A1502
A2503
A2504
A2506
A2502
A3503
A3504
A3506
A3502
A4503
A4504
A4506
A4502
A768
A766
A217
A218
A219
A220
RL201
RL202
RL203
C237
C238
C232
C233
C228
C229
C224
C225
C219
C220
C216
C217
C211
C212
C207
RL101
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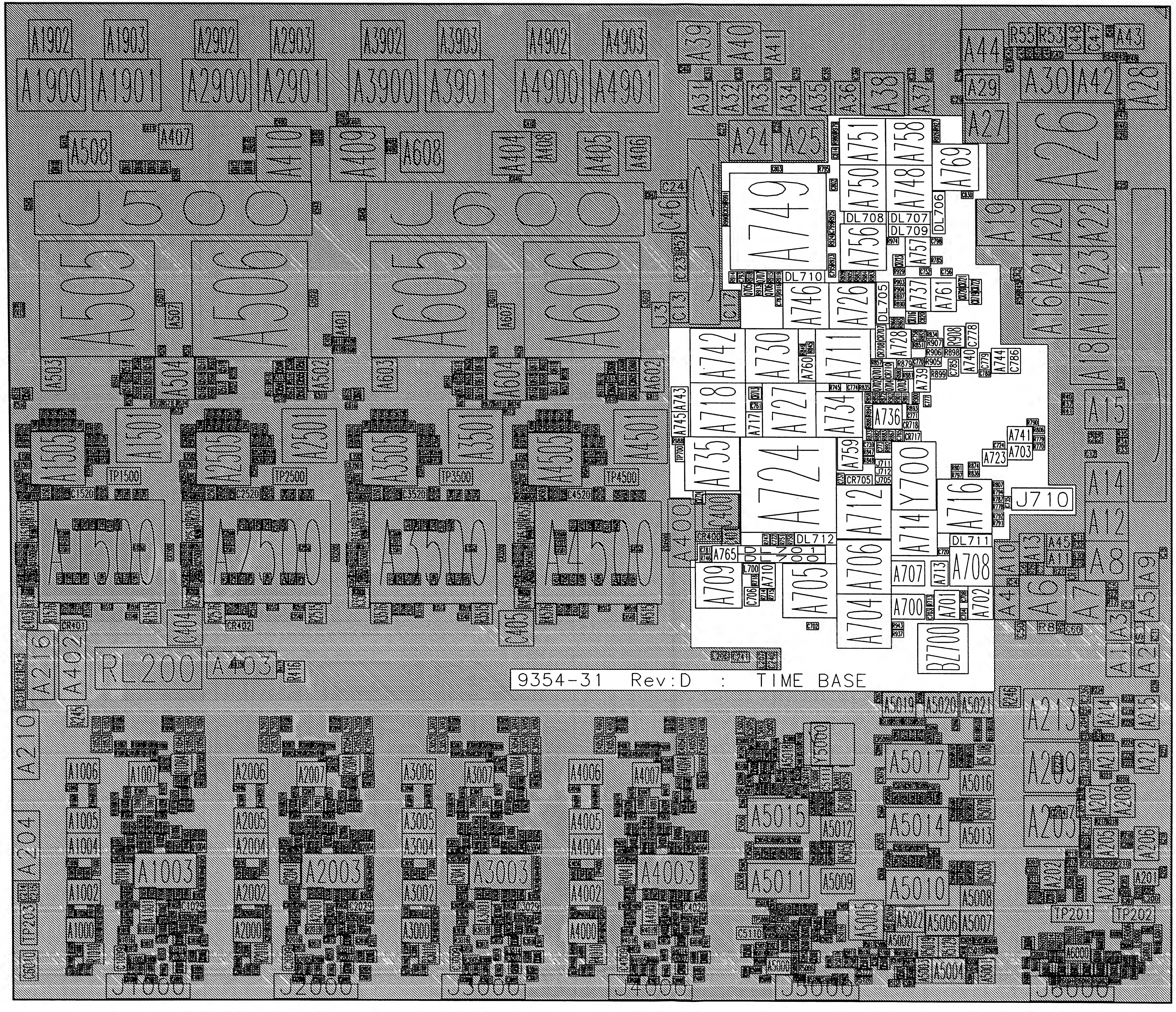
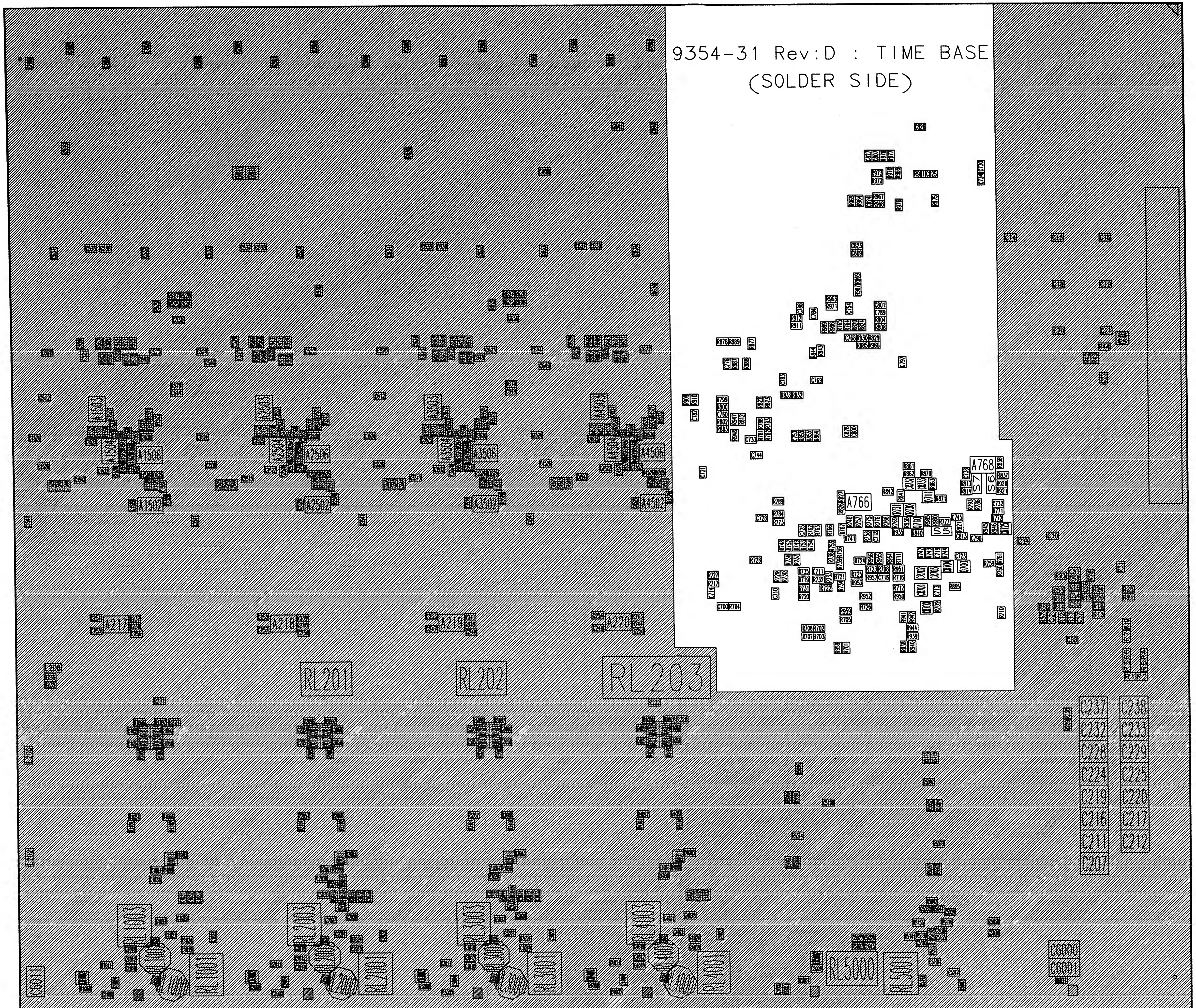
RL401
RL5000
RL501
C6000
C6001
C6011


9354-31 Rev:D : TIME BASE


9354-31 Rev:D : TIME BASE
(SOLDER SIDE)
A766
A768
RL201
RL202
RL203
C237
C238
C232
C233
C228
C229
C224
C225
C219
C220
C216
C217
C211
C212
C207
RL5000
C6000
C6001

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
A1	SM205618165	SM74HCT165	A200	SM207770442	SMDG442-PS
A2	SM200178138	SM74HCT138	A201	SM208470705	SMAD705
A3	SM200178030	SM74HCT30	A202	SM208870339	SMLM339
A4	SM200178138	SM74HCT138	A203	208124003	7912
A5	SM200178138	SM74HCT138	A204	208123002	7812
A6	SM206260858	SMADC0858	A205	SM208470347	SMLF347
A7	SM207970351	SM74HC4351	A206	SM207770201	SMDG201-PS
A8	SM206070584	SMPCD8584	A207	SM208470347	SMLF347
A9	SM207978251	SM74HCT251	A208	SM207770201	SMDG201-PS
A10	SM200178138	SM74HCT138	A209	208124003	7912
A11	SM205108002	SMPCF8582A	A210	208123002	7812
A12	SM206885245	SM74ABT245	A211	SM208470347	SMLF347
A13	SM200178000	SM74HCT00	A212	SM207770201	SMDG201-PS
A14	SM206885245	SM74ABT245	A213	208124002	7905
A15	SM207171244	SM74ABT244	A214	SM208470347	SMLF347
A16	SM205045357	CHEMIN-A	A215	SM207770201	SMDG201-PS
A17	SM205045358	ROUTE3-C	A216	208122002	7805
A18	SM205045355	RUELLE-A	A400	208124003	7912
A19	SM205045356	ARTERE-A	A401	SM201174011	SM10EL11
A20	SM205045354	AVENUE-A	A402	208123002	7812
A21	SM205045350	ROUTE1-A	A403	208122002	7805
A22	SM205045352	ROUTE2-B	A404	SM207172241	SM74ABT241
A23	SM205045351	ROUTE2-A	A405	SM207172241	SM74ABT241
A24	SM207171244	SM74ABT244	A406	SM207970139	SM74F139
A25	SM207171244	SM74ABT244	A407	SM207970139	SM74F139
A26	MCL404	MCL404	A408	SM200172008	SM74F08
A27	SM207171244	SM74ABT244	A409	SM207961158	SM10E158
A28	SM205045300	MIMOSA-A	A410	SM207961158	SM10E158
A29	SM207972157	SM74F157A	A502	SM205618594	SM74HC594-PS
A30	SM207280703	SMDAC703	A503	SM205618594	SM74HC594-PS
A31	SM200169191	SM74F191	A504	SM207288800	SMDAC8800
A32	SM200169191	SM74F191	A505	MDX416	MDX416
A33	SM200169191	SM74F191	A506	MDX416	MDX416
A34	SM200169191	SM74F191	A507	SM201174011	SM10EL11
A35	SM200169191	SM74F191	A508	SM207171244	SM74ABT244
A36	SM207970139	SM74F139	A602	SM205618594	SM74HC594-PS
A37	SM200278040	SM74HCT4040	A603	SM205618594	SM74HC594-PS
A38	SM207172241	SM74ABT241	A604	SM207288800	SMDAC8800
A39	SM206884623	SM74ABT623	A605	MDX416	MDX416
A40	SM206884623	SM74ABT623	A606	MDX416	MDX416
A41	SM207970139	SM74F139	A607	SM201174011	SM10EL11
A42	SM200178374	SM74HCT374	A608	SM207171244	SM74ABT244
A43	SM200178074	SM74HCT74	A700	SM205618594	SM74HC594-PS
A44	SM200178273	SM74HCT273	A701	SM200178002	SM74HCT02
A45	SM208570805	SM78L05	A702	SM207978251	SM74HCT251

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
A703	SM201274033	SM10EL33	A1000	SM208870339	SMLM339
A704	SM206970457	SM10E457	A1001	SM208470705	SMAD705
A705	SM206970457	SM10E457	A1002	SM207770201	SMDG201-PS
A706	SM201164104	SM10E104	A1003	MFE409	MFE409
A707	SM205618594	SM74HC594-PS	A1004	SM289772003	SMULN2003
A708	SM200178273	SM74HCT273	A1005	SM205618594	SM74HC594-PS
A709	SM200167102	SM10H102	A1006	SM205618594	SM74HC594-PS
A710	SM201174011	SM10EL11	A1007	SM208470347	SMLF347
A711	SM201164131	SM10E131	A1500	HSH416	HSH416
A712	SM207960157	SM10E157	A1501	SM201166195	SM10E195
A713	SM201570016	SM10EL16	A1502	SM201174005	SM10EL05
A714	SM200167164	SM10H164	A1503	SM201174011	SM10EL11
A716	SM206970457	SM10E457	A1504	SM201174005	SM10EL05
A717	SM201174001	SM10EL01	A1505	SM207260718	SMTDA8718
A718	SM201164131	SM10E131	A1506	SM201174011	SM10EL11
A723	SM201274032	SM10EL32	A1900	SM205701070	SRAM128Kx8-70
A724	MST412	MST412	A1901	SM205701070	SRAM128Kx8-70
A726	SM207360125	SM10125	A1902	SM206884623	SM74ABT623
A727	SM200169016	SM10E016	A1903	SM206884623	SM74ABT623
A728	SM200178002	SM74HCT02	A2000	SM208870339	SMLM339
A730	SM201164167	SM10E167	A2001	SM208470705	SMAD705
A734	SM207360125	SM10125	A2002	SM207770201	SMDG201-PS
A735	SM200169016	SM10E016	A2003	MFE409	MFE409
A736	SM208030245	SMSL3245	A2004	SM289772003	SMULN2003
A737	SM205618594	SM74HC594-PS	A2005	SM205618594	SM74HC594-PS
A739	SM208470353	SMLF353	A2006	SM205618594	SM74HC594-PS
A740	SM208570078	SM78L12	A2007	SM208470347	SMLF347
A741	SM201274032	SM10EL32	A2500	HSH416	HSH416
A742	SM200169016	SM10E016	A2501	SM201166195	SM10E195
A743	SM201274032	SM10EL32	A2502	SM201174005	SM10EL05
A744	SM208880079	SM79L12	A2503	SM201174011	SM10EL11
A745	SM201174001	SM10EL01	A2504	SM201174005	SM10EL05
A746	SM207360125	SM10125	A2505	SM207260718	SMTDA8718
A748	SM200167102	SM10H102	A2506	SM201174011	SM10EL11
A749	MTB411	MTB411	A2900	SM205701070	SRAM128Kx8-70
A750	SM200167131	SM10H131	A2901	SM205701070	SRAM128Kx8-70
A751	SM207367125	SM10H125	A2902	SM206884623	SM74ABT623
A756	SM207367124	SM10H124	A2903	SM206884623	SM74ABT623
A757	SM200178074	SM74HCT74	A3000	SM208870339	SMLM339
A758	SM200167131	SM10H131	A3001	SM208470705	SMAD705
A759	SM207170367	SM74HC367	A3002	SM207770201	SMDG201-PS
A760	SM201174031	SM10EL31	A3003	MFE409	MFE409
A761	SM205618594	SM74HC594-PS	A3004	SM289772003	SMULN2003
A765	SM201174031	SM10EL31	A3005	SM205618594	SM74HC594-PS
A769	SM207367125	SM10H125	A3006	SM205618594	SM74HC594-PS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
A3007	SM208470347	SMLF347
A3500	HSH416	HSH416
A3501	SM201166195	SM10E195
A3502	SM201174005	SM10EL05
A3503	SM201174011	SM10EL11
A3504	SM201174005	SM10EL05
A3505	SM207260718	SMTDA8718
A3506	SM201174011	SM10EL11
A3900	SM205701070	SRAM128Kx8-70
A3901	SM205701070	SRAM128Kx8-70
A3902	SM206884623	SM74ABT623
A3903	SM206884623	SM74ABT623
A4000	SM208870339	SMLM339
A4001	SM208470705	SMAD705
A4002	SM207770201	SMDG201-PS
A4003	MFE409	MFE409
A4004	SM289772003	SMULN2003
A4005	SM205618594	SM74HC594-PS
A4006	SM205618594	SM74HC594-PS
A4007	SM208470347	SMLF347
A4500	HSH416	HSH416
A4501	SM201166195	SM10E195
A4502	SM201174005	SM10EL05
A4503	SM201174011	SM10EL11
A4504	SM201174005	SM10EL05
A4505	SM207260718	SMTDA8718
A4506	SM201174011	SM10EL11
A4900	SM205701070	SRAM128Kx8-70
A4901	SM205701070	SRAM128Kx8-70
A4902	SM206884623	SM74ABT623
A4903	SM206884623	SM74ABT623
A5000	SM208470705	SMAD705
A5001	SM208971881	SMLM1881
A5002	SM208470037	SMOP37
A5003	SM208470351	SMLF351
A5004	SM207770403	SMDG403-PS
A5005	SM207970508	SMDG508-PS
A5006	SM205618594	SM74HC594-PS
A5007	SM207770442	SMDG442-PS
A5008	SM205618594	SM74HC594-PS
A5009	SM205618594	SM74HC594-PS
A5010	MTR408	MTR408
A5011	MTR408	MTR408
A5012	SM205618594	SM74HC594-PS
A5013	SM205618594	SM74HC594-PS
A5014	MTR408	MTR408
A5015	MTR408	MTR408
A5016	SM205618594	SM74HC594-PS
A5017	MTR408	MTR408
A5018	SM201570016	SM10EL16-PS
A5019	SM205618594	SM74HC594-PS
A5020	SM205618594	SM74HC594-PS
A5021	SM207978153	SM74HCT153-PS
A5022	SM208870339	SMLM339
A6000	SM208470353	SMLF353
C1	SM661207103	SM.01uFS
C2	SM661207104	SM.1uFS
C3	SM661207103	SM.01uFS
C4	SM661207103	SM.01uFS
C5	SM661207103	SM.01uFS
C6	SM661255181	SM180pFS
C7	SM661207104	SM.1uFS
C8	SM661207103	SM.01uFS
C9	SM661207103	SM.01uFS
C10	SM661207103	SM.01uFS
C11	SM661207103	SM.01uFS
C12	SM661207103	SM.01uFS
C13	SM666247106	SM10uF-25V
C14	SM661207103	SM.01uFS
C15	SM661207103	SM.01uFS
C16	SM661207103	SM.01uFS
C17	SM666247106	SM10uF-25V
C18	SM661207103	SM.01uFS
C19	SM661207103	SM.01uFS
C20	SM661207103	SM.01uFS
C21	SM661207103	SM.01uFS
C22	SM661207103	SM.01uFS
C23	SM666377226	SM22uF-15V
C24	SM666377226	SM22uF-15V
C25	SM661207103	SM.01uFS
C26	SM661207103	SM.01uFS
C27	SM661207103	SM.01uFS
C28	SM661207103	SM.01uFS
C29	SM661207103	SM.01uFS
C30	SM661207103	SM.01uFS
C31	SM661207103	SM.01uFS
C32	SM661207103	SM.01uFS
C33	SM661207103	SM.01uFS
C34	SM661207103	SM.01uFS
C35	SM661207103	SM.01uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
C36	SM661207103	SM.01uFS
C37	SM661207103	SM.01uFS
C38	SM661207103	SM.01uFS
C39	SM661207103	SM.01uFS
C40	SM661207103	SM.01uFS
C41	SM661207104	SM.1uFS
C42	SM661207103	SM.01uFS
C43	SM661207103	SM.01uFS
C44	SM661207103	SM.01uFS
C45	SM661207104	SM.1uFS
C46	146544471	470uF-25V
C47	SM666247106	SM10uF-25V
C48	SM666247106	SM10uF-25V
C49	SM661207103	SM.01uFS
C50	SM666327225	SM2.2uF-20V
C51	SM661207104	SM.1uFS
C52	SM661207104	SM.1uFS
C53	SM661207104	SM.1uFS
C54	SM661207104	SM.1uFS
C55	SM661207104	SM.1uFS
C56	SM661207104	SM.1uFS
C57	SM661207104	SM.1uFS
C58	SM661207104	SM.1uFS
C60	SM666327225	SM2.2uF-20V
C200	SM661207103	SM.01uFS
C201	SM661207103	SM.01uFS
C202	SM661207104	SM.1uFS
C203	SM661207103	SM.01uFS
C204	SM666327225	SM2.2uF-20V
C205	SM661207103	SM.01uFS
C206	SM661207103	SM.01uFS
C207	SM661726103	SM.01uF-NPO
C208	SM661207103	SM.01uFS
C209	SM661207103	SM.01uFS
C210	SM661207103	SM.01uFS
C211	SM661726103	SM.01uF-NPO
C212	SM661726103	SM.01uF-NPO
C213	SM666327225	SM2.2uF-20V
C214	SM666327225	SM2.2uF-20V
C215	SM666327225	SM2.2uF-20V
C216	SM661726103	SM.01uF-NPO
C217	SM661726103	SM.01uF-NPO
C218	SM661207103	SM.01uFS
C219	SM661726103	SM.01uF-NPO
C220	SM661726103	SM.01uF-NPO

Location	Part Number	Description
C221	SM666327225	SM2.2uF-20V
C222	SM666327225	SM2.2uF-20V
C223	SM666327225	SM2.2uF-20V
C224	SM661726103	SM.01uF-NPO
C225	SM661726103	SM.01uF-NPO
C226	SM661207103	SM.01uFS
C227	SM661207103	SM.01uFS
C228	SM661726103	SM.01uF-NPO
C229	SM661726103	SM.01uF-NPO
C230	SM661207103	SM.01uFS
C231	SM666327225	SM2.2uF-20V
C232	SM661726103	SM.01uF-NPO
C233	SM661726103	SM.01uF-NPO
C234	SM661207103	SM.01uFS
C235	SM661207103	SM.01uFS
C236	SM666327225	SM2.2uF-20V
C237	SM661726103	SM.01uF-NPO
C238	SM661726103	SM.01uF-NPO
C239	SM661207103	SM.01uFS
C240	SM666327225	SM2.2uF-20V
C241	SM666327225	SM2.2uF-20V
C242	SM666327225	SM2.2uF-20V
C247	SM661207103	SM.01uFS
C248	SM661207103	SM.01uFS
C249	SM661207103	SM.01uFS
C250	SM661207103	SM.01uFS
C251	SM661207103	SM.01uFS
C252	SM661207103	SM.01uFS
C253	SM661207103	SM.01uFS
C254	SM661207103	SM.01uFS
C255	SM661207103	SM.01uFS
C256	SM661207103	SM.01uFS
C257	SM661207103	SM.01uFS
C258	SM661207103	SM.01uFS
C400	146574227	220uF-25V
C401	146554476	47uF-25V
C402	SM661207103	SM.01uFS
C403	146554476	47uF-25V
C404	146574227	220uF-25V
C405	146574227	220uF-25V
C406	SM661207103	SM.01uFS
C407	SM661207103	SM.01uFS
C408	SM661207103	SM.01uFS
C410	SM661207103	SM.01uFS
C411	SM661207103	SM.01uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
C412	SM661207103	SM.01uFS
C413	SM661207103	SM.01uFS
C508	SM661207103	SM.01uFS
C510	SM661207103	SM.01uFS
C511	SM661207103	SM.01uFS
C512	SM661207103	SM.01uFS
C513	SM661207103	SM.01uFS
C516	SM661207103	SM.01uFS
C520	SM661207104	SM.1uFS
C521	SM661207104	SM.1uFS
C522	SM661207104	SM.1uFS
C523	SM661207104	SM.1uFS
C524	SM661207104	SM.1uFS
C525	SM661207104	SM.1uFS
C526	SM661207104	SM.1uFS
C527	SM661207104	SM.1uFS
C528	SM661207103	SM.01uFS
C529	SM661207103	SM.01uFS
C530	SM661207103	SM.01uFS
C531	SM661207104	SM.1uFS
C532	SM661207104	SM.1uFS
C533	SM661207104	SM.1uFS
C534	SM661207104	SM.1uFS
C535	SM661207104	SM.1uFS
C536	SM661207104	SM.1uFS
C537	SM661207104	SM.1uFS
C538	SM661207104	SM.1uFS
C539	SM661207103	SM.01uFS
C542	SM661207103	SM.01uFS
C543	SM661207103	SM.01uFS
C544	SM661207103	SM.01uFS
C545	SM661207104	SM.1uFS
C546	SM661207104	SM.1uFS
C547	SM661207104	SM.1uFS
C548	SM661207104	SM.1uFS
C549	SM661207104	SM.1uFS
C608	SM661207103	SM.01uFS
C610	SM661207103	SM.01uFS
C611	SM661207103	SM.01uFS
C612	SM661207103	SM.01uFS
C613	SM661207103	SM.01uFS
C616	SM661207103	SM.01uFS
C620	SM661207104	SM.1uFS
C621	SM661207104	SM.1uFS
C622	SM661207104	SM.1uFS

Location	Part Number	Description
C623	SM661207104	SM.1uFS
C624	SM661207104	SM.1uFS
C625	SM661207104	SM.1uFS
C626	SM661207104	SM.1uFS
C627	SM661207104	SM.1uFS
C628	SM661207103	SM.01uFS
C629	SM661207103	SM.01uFS
C630	SM661207103	SM.01uFS
C631	SM661207104	SM.1uFS
C632	SM661207104	SM.1uFS
C633	SM661207104	SM.1uFS
C634	SM661207104	SM.1uFS
C635	SM661207104	SM.1uFS
C636	SM661207104	SM.1uFS
C637	SM661207104	SM.1uFS
C638	SM661207104	SM.1uFS
C639	SM661207103	SM.01uFS
C640	SM661207103	SM.01uFS
C641	SM661207103	SM.01uFS
C642	SM661207103	SM.01uFS
C643	SM661207103	SM.01uFS
C644	SM661207103	SM.01uFS
C645	SM661207104	SM.1uFS
C646	SM661207104	SM.1uFS
C647	SM661207104	SM.1uFS
C648	SM661207104	SM.1uFS
C649	SM661207104	SM.1uFS
C700	SM661207103	SM.01uFS
C702	SM661207103	SM.01uFS
C703	SM661207103	SM.01uFS
C704	SM661207103	SM.01uFS
C706	SM158240200	SM0.6-2.5pF
C708	SM661255560	SM56pFS
C710	SM661207103	SM.01uFS
C711	SM661207103	SM.01uFS
C713	SM661207103	SM.01uFS
C714	SM661207103	SM.01uFS
C716	SM661207103	SM.01uFS
C718	SM661207103	SM.01uFS
C719	SM661207103	SM.01uFS
C720	SM661207103	SM.01uFS
C721	SM661207103	SM.01uFS
C722	SM661207103	SM.01uFS
C723	SM661207103	SM.01uFS
C724	SM661207103	SM.01uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
C725	SM661207103	SM.01uFS
C728	SM661207103	SM.01uFS
C730	SM661207103	SM.01uFS
C732	SM661207103	SM.01uFS
C733	SM661255560	SM56pFS
C734	SM661207103	SM.01uFS
C735	SM661207103	SM.01uFS
C737	SM661207103	SM.01uFS
C738	SM661207103	SM.01uFS
C739	SM661207103	SM.01uFS
C744	SM661207103	SM.01uFS
C745	SM661207103	SM.01uFS
C752	SM661207103	SM.01uFS
C753	SM661207103	SM.01uFS
C754	SM661207103	SM.01uFS
C756	SM661207103	SM.01uFS
C758	SM661255056	SM5.6pFS
C760	SM661207103	SM.01uFS
C761	SM661207103	SM.01uFS
C765	SM661255101	SM100pFS
C768	SM661207103	SM.01uFS
C769	SM661207103	SM.01uFS
C770	SM661207103	SM.01uFS
C771	SM661207103	SM.01uFS
C773	SM661207103	SM.01uFS
C774	SM661207103	SM.01uFS
C776	SM661207103	SM.01uFS
C777	SM661207103	SM.01uFS
C778	SM661446474	SM.47uF
C779	SM666327225	SM2.2uF-20V
C780	SM661207103	SM.01uFS
C781	SM661207103	SM.01uFS
C782	SM661207103	SM.01uFS
C783	SM661207103	SM.01uFS
C784	SM661207103	SM.01uFS
C785	SM666327225	SM2.2uF-20V
C786	SM661446474	SM.47uF
C787	SM661207103	SM.01uFS
C788	SM661207103	SM.01uFS
C789	SM661207103	SM.01uFS
C790	SM661207103	SM.01uFS
C793	SM661207103	SM.01uFS
C795	SM661207103	SM.01uFS
C797	SM661207103	SM.01uFS
C798	SM661207103	SM.01uFS

Location	Part Number	Description
C799	SM661207103	SM.01uFS
C800	SM661207103	SM.01uFS
C801	SM661207103	SM.01uFS
C802	SM661207103	SM.01uFS
C803	SM661207103	SM.01uFS
C807	SM661207103	SM.01uFS
C809	SM661207103	SM.01uFS
C813	SM661207103	SM.01uFS
C814	SM661207103	SM.01uFS
C820	SM661207103	SM.01uFS
C823	SM661207103	SM.01uFS
C824	SM661207103	SM.01uFS
C825	SM661207103	SM.01uFS
C826	SM661207103	SM.01uFS
C827	SM661207103	SM.01uFS
C828	SM661207103	SM.01uFS
C829	SM661255180	SM18pFS
C830	SM661207103	SM.01uFS
C1000	SM661207104	SM.1uFS
C1001	SM661207103	SM.01uFS
C1002	SM661207103	SM.01uFS
C1003	SM661207104	SM.1uFS
C1004	SM661207104	SM.1uFS
C1005	SM661255056	SM5.6pFS
C1006	SM661207103	SM.01uFS
C1007	SM661207103	SM.01uFS
C1008	SM661207104	SM.1uFS
C1009	158849012	5-15pF-S
C1010	SM661256120	SM12pFS
C1012	SM661255820	SM82pFS
C1014	SM661207103	SM.01uFS
C1015	SM661495561	SM560pFS-500V
C1016	SM661207104	SM.1uFS
C1017	SM661207103	SM.01uFS
C1018	SM661207103	SM.01uFS
C1019	SM661207103	SM.01uFS
C1020	SM661207223	SM.022uFS
C1021	SM661207103	SM.01uFS
C1022	SM661207103	SM.01uFS
C1023	SM661207104	SM.1uFS
C1024	SM661207103	SM.01uFS
C1025	SM661207103	SM.01uFS
C1026	SM661207103	SM.01uFS
C1027	SM661255056	SM5.6pFS
C1028	SM661207103	SM.01uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
C1029	158849009	0.5-2.5pF-S
C1030	SM661255330	SM33pFS
C1031	SM661207103	SM.01uFS
C1032	SM661207103	SM.01uFS
C1033	SM661207103	SM.01uFS
C1034	SM661207103	SM.01uFS
C1036	SM661207103	SM.01uFS
C1037	SM661207103	SM.01uFS
C1038	SM661207103	SM.01uFS
C1039	SM661207103	SM.01uFS
C1040	SM661207103	SM.01uFS
C1041	SM661255101	SM100pFS
C1042	SM661255101	SM100pFS
C1043	SM661207103	SM.01uFS
C1044	SM661207103	SM.01uFS
C1046	SM661207103	SM.01uFS
C1047	SM661207103	SM.01uFS
C1048	SM661207103	SM.01uFS
C1049	SM661207103	SM.01uFS
C1050	SM661207103	SM.01uFS
C1051	SM661207103	SM.01uFS
C1052	SM666327225	SM2.2uF-20V
C1053	SM666327225	SM2.2uF-20V
C1054	SM666327225	SM2.2uF-20V
C1055	SM666327225	SM2.2uF-20V
C1056	SM666327225	SM2.2uF-20V
C1057	SM661255121	SM120pFS
C1058	SM661255121	SM120pFS
C1059	SM661255180	SM18pFS
C1060	SM661255180	SM18pFS
C1061	SM661207103	SM.01uFS
C1500	SM661207103	SM.01uFS
C1501	SM661207103	SM.01uFS
C1502	SM661207103	SM.01uFS
C1503	SM661207103	SM.01uFS
C1504	SM661207103	SM.01uFS
C1505	SM661207103	SM.01uFS
C1506	SM661255152	SM1500pFS
C1507	SM661207103	SM.01uFS
C1508	SM661207103	SM.01uFS
C1509	SM661207103	SM.01uFS
C1510	SM661207103	SM.01uFS
C1511	SM661207103	SM.01uFS
C1512	SM661207103	SM.01uFS
C1513	SM661207103	SM.01uFS
C1514	SM661207103	SM.01uFS
C1515	SM661207103	SM.01uFS
C1518	SM661205472	SM.0047uFS
C1519	SM661207104	SM.1uFS
C1520	158849010	1-5pF-S
C1521	SM661207103	SM.01uFS
C1522	SM661207104	SM.1uFS
C1523	SM661207104	SM.1uFS
C1524	SM661207104	SM.1uFS
C1525	SM661207104	SM.1uFS
C1526	SM661207104	SM.1uFS
C1527	SM661207104	SM.1uFS
C1528	SM661207104	SM.1uFS
C1529	SM661207104	SM.1uFS
C1530	SM661207104	SM.1uFS
C1531	SM661207104	SM.1uFS
C1532	SM661207104	SM.1uFS
C1533	SM661207104	SM.1uFS
C1537	SM661207104	SM.1uFS
C1540	SM661207104	SM.1uFS
C1541	SM661207104	SM.1uFS
C1542	SM661207104	SM.1uFS
C1543	SM661207104	SM.1uFS
C1544	SM661207104	SM.1uFS
C1545	SM661207104	SM.1uFS
C1547	SM661207104	SM.1uFS
C1548	SM661207102	SM.001uFS
C1549	SM661207102	SM.001uFS
C1552	SM661207103	SM.01uFS
C1553	SM158240202	SM2.5-10pF
C1554	SM661207103	SM.01uFS
C1555	SM661255033	SM3.3pFS
C1900	SM661207103	SM.01uFS
C1901	SM661207103	SM.01uFS
C1902	SM661207103	SM.01uFS
C1903	SM661207103	SM.01uFS
C2000	SM661207104	SM.1uFS
C2001	SM661207103	SM.01uFS
C2002	SM661207103	SM.01uFS
C2003	SM661207104	SM.1uFS
C2004	SM661207104	SM.1uFS
C2005	SM661255056	SM5.6pFS
C2006	SM661207103	SM.01uFS
C2007	SM661207103	SM.01uFS
C2008	SM661207104	SM.1uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
C2009	158849012	5-15pF-S	C2058	SM661255121	SM120pFS
C2010	SM661256120	SM12pFS	C2059	SM661255180	SM18pFS
C2012	SM661255820	SM82pFS	C2060	SM661255180	SM18pFS
C2014	SM661207103	SM.01uFS	C2061	SM661207103	SM.01uFS
C2015	SM661495561	SM560pFS-500V	C2500	SM661207103	SM.01uFS
C2016	SM661207104	SM.1uFS	C2501	SM661207103	SM.01uFS
C2017	SM661207103	SM.01uFS	C2502	SM661207103	SM.01uFS
C2018	SM661207103	SM.01uFS	C2503	SM661207103	SM.01uFS
C2019	SM661207103	SM.01uFS	C2504	SM661207103	SM.01uFS
C2020	SM661207223	SM.022uFS	C2505	SM661207103	SM.01uFS
C2021	SM661207103	SM.01uFS	C2506	SM661255152	SM1500pFS
C2022	SM661207103	SM.01uFS	C2507	SM661207103	SM.01uFS
C2023	SM661207104	SM.1uFS	C2508	SM661207103	SM.01uFS
C2024	SM661207103	SM.01uFS	C2509	SM661207103	SM.01uFS
C2025	SM661207103	SM.01uFS	C2510	SM661207103	SM.01uFS
C2026	SM661207103	SM.01uFS	C2511	SM661207103	SM.01uFS
C2027	SM661255056	SM5.6pFS	C2512	SM661207103	SM.01uFS
C2028	SM661207103	SM.01uFS	C2513	SM661207103	SM.01uFS
C2029	158849009	0.5-2.5pF-S	C2514	SM661207103	SM.01uFS
C2030	SM661255330	SM33pFS	C2515	SM661207103	SM.01uFS
C2031	SM661207103	SM.01uFS	C2518	SM661205472	SM.0047uFS
C2032	SM661207103	SM.01uFS	C2519	SM661207104	SM.1uFS
C2033	SM661207103	SM.01uFS	C2520	158849010	1-5pF-S
C2034	SM661207103	SM.01uFS	C2521	SM661207103	SM.01uFS
C2036	SM661207103	SM.01uFS	C2522	SM661207104	SM.1uFS
C2037	SM661207103	SM.01uFS	C2523	SM661207104	SM.1uFS
C2038	SM661207103	SM.01uFS	C2524	SM661207104	SM.1uFS
C2039	SM661207103	SM.01uFS	C2525	SM661207104	SM.1uFS
C2040	SM661207103	SM.01uFS	C2526	SM661207104	SM.1uFS
C2041	SM661255101	SM100pFS	C2527	SM661207104	SM.1uFS
C2042	SM661255101	SM100pFS	C2528	SM661207104	SM.1uFS
C2043	SM661207103	SM.01uFS	C2529	SM661207104	SM.1uFS
C2044	SM661207103	SM.01uFS	C2530	SM661207104	SM.1uFS
C2046	SM661207103	SM.01uFS	C2531	SM661207104	SM.1uFS
C2047	SM661207103	SM.01uFS	C2532	SM661207104	SM.1uFS
C2048	SM661207103	SM.01uFS	C2533	SM661207104	SM.1uFS
C2049	SM661207103	SM.01uFS	C2537	SM661207104	SM.1uFS
C2050	SM661207103	SM.01uFS	C2540	SM661207104	SM.1uFS
C2051	SM661207103	SM.01uFS	C2541	SM661207104	SM.1uFS
C2052	SM666327225	SM2.2uF-20V	C2542	SM661207104	SM.1uFS
C2053	SM666327225	SM2.2uF-20V	C2543	SM661207104	SM.1uFS
C2054	SM666327225	SM2.2uF-20V	C2544	SM661207104	SM.1uFS
C2055	SM666327225	SM2.2uF-20V	C2545	SM661207104	SM.1uFS
C2056	SM666327225	SM2.2uF-20V	C2547	SM661207104	SM.1uFS
C2057	SM661255121	SM120pFS	C2548	SM661207102	SM.001uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
C2549	SM661207102	SM.001uFS
C2552	SM661207103	SM.01uFS
C2553	SM158240202	SM2.5-10pF
C2554	SM661207103	SM.01uFS
C2555	SM661255033	SM3.3pFS
C2900	SM661207103	SM.01uFS
C2901	SM661207103	SM.01uFS
C2902	SM661207103	SM.01uFS
C2903	SM661207103	SM.01uFS
C3000	SM661207104	SM.1uFS
C3001	SM661207103	SM.01uFS
C3002	SM661207103	SM.01uFS
C3003	SM661207104	SM.1uFS
C3004	SM661207104	SM.1uFS
C3005	SM661255056	SM5.6pFS
C3006	SM661207103	SM.01uFS
C3007	SM661207103	SM.01uFS
C3008	SM661207104	SM.1uFS
C3009	158849012	5-15pF-S
C3010	SM661256120	SM12pFS
C3012	SM661255820	SM82pFS
C3014	SM661207103	SM.01uFS
C3015	SM661495561	SM560pFS-500V
C3016	SM661207104	SM.1uFS
C3017	SM661207103	SM.01uFS
C3018	SM661207103	SM.01uFS
C3019	SM661207103	SM.01uFS
C3020	SM661207223	SM.022uFS
C3021	SM661207103	SM.01uFS
C3022	SM661207103	SM.01uFS
C3023	SM661207104	SM.1uFS
C3024	SM661207103	SM.01uFS
C3025	SM661207103	SM.01uFS
C3026	SM661207103	SM.01uFS
C3027	SM661255056	SM5.6pFS
C3028	SM661207103	SM.01uFS
C3029	158849009	0.5-2.5pF-S
C3030	SM661255330	SM33pFS
C3031	SM661207103	SM.01uFS
C3032	SM661207103	SM.01uFS
C3033	SM661207103	SM.01uFS
C3034	SM661207103	SM.01uFS
C3036	SM661207103	SM.01uFS
C3037	SM661207103	SM.01uFS
C3038	SM661207103	SM.01uFS
C3039	SM661207103	SM.01uFS
C3040	SM661207103	SM.01uFS
C3041	SM661255101	SM100pFS
C3042	SM661255101	SM100pFS
C3043	SM661207103	SM.01uFS
C3044	SM661207103	SM.01uFS
C3046	SM661207103	SM.01uFS
C3047	SM661207103	SM.01uFS
C3048	SM661207103	SM.01uFS
C3049	SM661207103	SM.01uFS
C3050	SM661207103	SM.01uFS
C3051	SM661207103	SM.01uFS
C3052	SM666327225	SM2.2uF-20V
C3053	SM666327225	SM2.2uF-20V
C3054	SM666327225	SM2.2uF-20V
C3055	SM666327225	SM2.2uF-20V
C3056	SM666327225	SM2.2uF-20V
C3057	SM661255121	SM120pFS
C3058	SM661255121	SM120pFS
C3059	SM661255180	SM18pFS
C3060	SM661255180	SM18pFS
C3061	SM661207103	SM.01uFS
C3500	SM661207103	SM.01uFS
C3501	SM661207103	SM.01uFS
C3502	SM661207103	SM.01uFS
C3503	SM661207103	SM.01uFS
C3504	SM661207103	SM.01uFS
C3505	SM661207103	SM.01uFS
C3506	SM661255152	SM1500pFS
C3507	SM661207103	SM.01uFS
C3508	SM661207103	SM.01uFS
C3509	SM661207103	SM.01uFS
C3510	SM661207103	SM.01uFS
C3511	SM661207103	SM.01uFS
C3512	SM661207103	SM.01uFS
C3513	SM661207103	SM.01uFS
C3514	SM661207103	SM.01uFS
C3515	SM661207103	SM.01uFS
C3518	SM661205472	SM.0047uFS
C3519	SM661207104	SM.1uFS
C3520	158849010	1-5pF-S
C3521	SM661207103	SM.01uFS
C3522	SM661207104	SM.1uFS
C3523	SM661207104	SM.1uFS
C3524	SM661207104	SM.1uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
C3525	SM661207104	SM.1uFS
C3526	SM661207104	SM.1uFS
C3527	SM661207104	SM.1uFS
C3528	SM661207104	SM.1uFS
C3529	SM661207104	SM.1uFS
C3530	SM661207104	SM.1uFS
C3531	SM661207104	SM.1uFS
C3532	SM661207104	SM.1uFS
C3533	SM661207104	SM.1uFS
C3537	SM661207104	SM.1uFS
C3540	SM661207104	SM.1uFS
C3541	SM661207104	SM.1uFS
C3542	SM661207104	SM.1uFS
C3543	SM661207104	SM.1uFS
C3544	SM661207104	SM.1uFS
C3545	SM661207104	SM.1uFS
C3547	SM661207104	SM.1uFS
C3548	SM661207102	SM.001uFS
C3549	SM661207102	SM.001uFS
C3552	SM661207103	SM.01uFS
C3553	SM158240202	SM2.5-10pF
C3554	SM661207103	SM.01uFS
C3555	SM661255033	SM3.3pFS
C3900	SM661207103	SM.01uFS
C3901	SM661207103	SM.01uFS
C3902	SM661207103	SM.01uFS
C3903	SM661207103	SM.01uFS
C4000	SM661207104	SM.1uFS
C4001	SM661207103	SM.01uFS
C4002	SM661207103	SM.01uFS
C4003	SM661207104	SM.1uFS
C4004	SM661207104	SM.1uFS
C4005	SM661255056	SM5.6pFS
C4006	SM661207103	SM.01uFS
C4007	SM661207103	SM.01uFS
C4008	SM661207104	SM.1uFS
C4009	158849012	5-15pF-S
C4010	SM661256120	SM12pFS
C4012	SM661255820	SM82pFS
C4014	SM661207103	SM.01uFS
C4015	SM661495561	SM560pFS-500V
C4016	SM661207104	SM.1uFS
C4017	SM661207103	SM.01uFS
C4018	SM661207103	SM.01uFS
C4019	SM661207103	SM.01uFS
C4020	SM661207223	SM.022uFS
C4021	SM661207103	SM.01uFS
C4022	SM661207103	SM.01uFS
C4023	SM661207104	SM.1uFS
C4024	SM661207103	SM.01uFS
C4025	SM661207103	SM.01uFS
C4026	SM661207103	SM.01uFS
C4027	SM661255056	SM5.6pFS
C4028	SM661207103	SM.01uFS
C4029	158849009	0.5-2.5pF-S
C4030	SM661255330	SM33pFS
C4031	SM661207103	SM.01uFS
C4032	SM661207103	SM.01uFS
C4033	SM661207103	SM.01uFS
C4034	SM661207103	SM.01uFS
C4036	SM661207103	SM.01uFS
C4037	SM661207103	SM.01uFS
C4038	SM661207103	SM.01uFS
C4039	SM661207103	SM.01uFS
C4040	SM661207103	SM.01uFS
C4041	SM661255101	SM100pFS
C4042	SM661255101	SM100pFS
C4043	SM661207103	SM.01uFS
C4044	SM661207103	SM.01uFS
C4046	SM661207103	SM.01uFS
C4047	SM661207103	SM.01uFS
C4048	SM661207103	SM.01uFS
C4049	SM661207103	SM.01uFS
C4050	SM661207103	SM.01uFS
C4051	SM661207103	SM.01uFS
C4052	SM666327225	SM2.2uF-20V
C4053	SM666327225	SM2.2uF-20V
C4054	SM666327225	SM2.2uF-20V
C4055	SM666327225	SM2.2uF-20V
C4056	SM666327225	SM2.2uF-20V
C4057	SM661255121	SM120pFS
C4058	SM661255121	SM120pFS
C4059	SM661255180	SM18pFS
C4060	SM661255180	SM18pFS
C4061	SM661207103	SM.01uFS
C4500	SM661207103	SM.01uFS
C4501	SM661207103	SM.01uFS
C4502	SM661207103	SM.01uFS
C4503	SM661207103	SM.01uFS
C4504	SM661207103	SM.01uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
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C4505	SM661207103	SM.01uFS	C5000	SM661207104	SM.1uFS
C4506	SM661255152	SM1500pFS	C5001	SM661207104	SM.1uFS
C4507	SM661207103	SM.01uFS	C5002	SM661255010	SM1pFS
C4508	SM661207103	SM.01uFS	C5003	SM661207103	SM.01uFS
C4509	SM661207103	SM.01uFS	C5004	SM661207103	SM.01uFS
C4510	SM661207103	SM.01uFS	C5005	SM661255027	SM2.7pFS
C4511	SM661207103	SM.01uFS	C5006	SM661207103	SM.01uFS
C4512	SM661207103	SM.01uFS	C5007	SM661207103	SM.01uFS
C4513	SM661207103	SM.01uFS	C5008	SM661207103	SM.01uFS
C4514	SM661207103	SM.01uFS	C5009	SM661207103	SM.01uFS
C4515	SM661207103	SM.01uFS	C5010	SM661255033	SM3.3pFS
C4518	SM661205472	SM.0047uFS	C5011	SM661207103	SM.01uFS
C4519	SM661207104	SM.1uFS	C5012	SM661495561	SM560pFS-500V
C4520	158849010	1-5pF-S	C5013	SM661207103	SM.01uFS
C4521	SM661207103	SM.01uFS	C5014	SM661207104	SM.1uFS
C4522	SM661207104	SM.1uFS	C5015	SM661207103	SM.01uFS
C4523	SM661207104	SM.1uFS	C5016	SM661207103	SM.01uFS
C4524	SM661207104	SM.1uFS	C5017	SM661207103	SM.01uFS
C4525	SM661207104	SM.1uFS	C5018	SM661255821	SM820pFS
C4526	SM661207104	SM.1uFS	C5019	SM666327225	SM2.2uF-20V
C4527	SM661207104	SM.1uFS	C5020	SM661207104	SM.1uFS
C4528	SM661207104	SM.1uFS	C5021	SM661207103	SM.01uFS
C4529	SM661207104	SM.1uFS	C5022	SM661207103	SM.01uFS
C4530	SM661207104	SM.1uFS	C5023	SM661207103	SM.01uFS
C4531	SM661207104	SM.1uFS	C5024	SM661207103	SM.01uFS
C4532	SM661207104	SM.1uFS	C5025	SM661207103	SM.01uFS
C4533	SM661207104	SM.1uFS	C5026	SM661207103	SM.01uFS
C4537	SM661207104	SM.1uFS	C5027	SM661255100	SM10pFS
C4540	SM661207104	SM.1uFS	C5028	SM661255330	SM33pFS
C4541	SM661207104	SM.1uFS	C5029	SM661207103	SM.01uFS
C4542	SM661207104	SM.1uFS	C5030	SM661207103	SM.01uFS
C4543	SM661207104	SM.1uFS	C5031	SM661255150	SM15pFS
C4544	SM661207104	SM.1uFS	C5032	SM661255270	SM27pFS
C4545	SM661207104	SM.1uFS	C5033	SM661255270	SM27pFS
C4547	SM661207104	SM.1uFS	C5034	SM661207103	SM.01uFS
C4548	SM661207102	SM.001uFS	C5035	SM666427105	SM1uF-16V
C4549	SM661207102	SM.001uFS	C5036	SM661207103	SM.01uFS
C4552	SM661207103	SM.01uFS	C5037	SM661207103	SM.01uFS
C4553	SM158240202	SM2.5-10pF	C5038	SM666427105	SM1uF-16V
C4554	SM661207103	SM.01uFS	C5039	SM661207103	SM.01uFS
C4555	SM661255033	SM3.3pFS	C5040	SM661207103	SM.01uFS
C4900	SM661207103	SM.01uFS	C5041	SM661207103	SM.01uFS
C4901	SM661207103	SM.01uFS	C5042	SM661207103	SM.01uFS
C4902	SM661207103	SM.01uFS	C5043	SM661207103	SM.01uFS
C4903	SM661207103	SM.01uFS	C5044	SM661207103	SM.01uFS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
C5045	SM661207103	SM.01uFS
C5046	SM661207103	SM.01uFS
C5047	SM661207103	SM.01uFS
C5048	SM661207103	SM.01uFS
C5049	SM661205822	SM.0082uFS
C5050	SM661205822	SM.0082uFS
C5051	SM661255270	SM27pFS
C5052	SM661207103	SM.01uFS
C5053	SM661207103	SM.01uFS
C5054	SM661255270	SM27pFS
C5055	SM661207103	SM.01uFS
C5056	SM661207103	SM.01uFS
C5057	SM666427105	SM1uF-16V
C5058	SM666427105	SM1uF-16V
C5059	SM661207103	SM.01uFS
C5060	SM661207103	SM.01uFS
C5061	SM661207103	SM.01uFS
C5062	SM661207103	SM.01uFS
C5063	SM661207103	SM.01uFS
C5064	SM661207103	SM.01uFS
C5065	SM661207103	SM.01uFS
C5066	SM661207103	SM.01uFS
C5067	SM661207103	SM.01uFS
C5068	SM661205822	SM.0082uFS
C5069	SM661207103	SM.01uFS
C5070	SM661205822	SM.0082uFS
C5071	SM661207103	SM.01uFS
C5072	SM661207103	SM.01uFS
C5073	SM661207103	SM.01uFS
C5074	SM666327225	SM2.2uF-20V
C5075	SM666327225	SM2.2uF-20V
C5076	SM661255270	SM27pFS
C5077	SM661207103	SM.01uFS
C5078	SM661255101	SM100pFS
C5079	SM666427105	SM1uF-16V
C5081	SM661255150	SM15pFS
C5082	SM661255022	SM2.2pFS
C5083	SM661207103	SM.01uFS
C5084	SM661207103	SM.01uFS
C5085	SM661207103	SM.01uFS
C5086	SM661207103	SM.01uFS
C5087	SM661207103	SM.01uFS
C5088	SM661207103	SM.01uFS
C5089	SM661207103	SM.01uFS
C5090	SM661207103	SM.01uFS
C5091	SM661207103	SM.01uFS
C5092	SM666327225	SM2.2uF-20V
C5093	SM661205822	SM.0082uFS
C5094	SM661207103	SM.01uFS
C5095	SM666327225	SM2.2uF-20V
C5096	SM661207103	SM.01uFS
C5097	SM661207103	SM.01uFS
C5098	SM661207103	SM.01uFS
C5100	SM661207103	SM.01uFS
C5101	SM661207103	SM.01uFS
C5103	SM661207104	SM.1uFS
C5104	SM661207104	SM.1uFS
C5106	SM661207103	SM.01uFS
C5107	SM661255100	SM10pFS
C5108	SM661207103	SM.01uFS
C5110	SM666377226	SM22uF-15V
C5111	SM666377226	SM22uF-15V
C6000	SM666257336	SM33uF-16V
C6001	SM666257336	SM33uF-16V
C6003	SM666327225	SM2.2uF-20V
C6004	SM661207103	SM.01uFS
C6005	SM661207103	SM.01uFS
C6006	SM666327225	SM2.2uF-20V
C6007	SM661207103	SM.01uFS
C6008	SM661255102	SM1000pFS
C6009	SM661255056	SM5.6pFS
C6010	SM666257336	SM33uF-16V
C6011	SM666257336	SM33uF-16V
J1	454220096	3x32-ST-F-PF
J2	454115014	1x14-ST-M-FLPN
J3	454390002	1x2-ST-M-PL
J500	454111024	4x42-ST-F-PF
J600	454111024	4x42-ST-F-PF
J710	SM454120025	SM1x12-13-ST-F
J1000	7093XXP01	21 BNC-93XX
J2000	7093XXP01	21 BNC-93XX
J3000	7093XXP01	21 BNC-93XX
J4000	7093XXP01	21 BNC-93XX
J5000	7093XXP01	21 BNC-93XX
J6000	7093XXP01	21 BNC-93XX
L200	SM301502001	SMBEAD1206
L201	SM301502001	SMBEAD1206
L202	SM301502001	SMBEAD1206
L203	SM301502001	SMBEAD1206
L204	SM301502001	SMBEAD1206

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
L205	SM301502001	SMBEAD1206	L5000	SM301502001	SMBEAD1206
L206	SM301502001	SMBEAD1206	L5001	SM301502001	SMBEAD1206
L207	SM301502001	SMBEAD1206	L5002	SM301502001	SMBEAD1206
L208	SM301502001	SMBEAD1206	L5003	SM301502001	SMBEAD1206
L700	SM300446150	SM.015uH	L6000	SM301502001	SMBEAD1206
L1000	SM300486104	SM100uH	L6001	SM301502001	SMBEAD1206
L1001	SM300486104	SM100uH	Q510	SM275330858	BC858C
L1002	SM301502001	SMBEAD1206	Q511	SM275330858	BC858C
L1003	SM301502001	SMBEAD1206	Q512	SM275330858	BC858C
L1004	SM301502001	SMBEAD1206	Q513	SM275330858	BC858C
L1005	SM301502001	SMBEAD1206	Q514	SM275330858	BC858C
L1006	SM301502001	SMBEAD1206	Q516	SM275330858	BC858C
L1500	SM669080181	SMBEAD0805	Q517	SM275330858	BC858C
L1501	SM669080181	SMBEAD0805	Q518	SM275330858	BC858C
L1502	SM654101000	SM0S	Q610	SM275330858	BC858C
L2000	SM300486104	SM100uH	Q611	SM275330858	BC858C
L2001	SM300486104	SM100uH	Q612	SM275330858	BC858C
L2002	SM301502001	SMBEAD1206	Q613	SM275330858	BC858C
L2003	SM301502001	SMBEAD1206	Q614	SM275330858	BC858C
L2004	SM301502001	SMBEAD1206	Q616	SM275330858	BC858C
L2005	SM301502001	SMBEAD1206	Q617	SM275330858	BC858C
L2006	SM301502001	SMBEAD1206	Q618	SM275330858	BC858C
L2500	SM669080181	SMBEAD0805	Q700	SM275030092	BFT92
L2501	SM669080181	SMBEAD0805	Q701	SM270030020	BFS20
L2502	SM654101000	SM0S	Q702	SM207130025	BFT25A
L3000	SM300486104	SM100uH	Q703	SM275330858	BC858C
L3001	SM300486104	SM100uH	Q704	SM275330858	BC858C
L3002	SM301502001	SMBEAD1206	Q705	SM275030092	BFT92
L3003	SM301502001	SMBEAD1206	Q706	SM275030092	BFT92
L3004	SM301502001	SMBEAD1206	Q707	SM275030092	BFT92
L3005	SM301502001	SMBEAD1206	Q1000	SM280120416	MMBF4416
L3006	SM301502001	SMBEAD1206	Q1001	SM270130092	BFR92A
L3500	SM669080181	SMBEAD0805	Q1002	SM270130092	BFR92A
L3501	SM669080181	SMBEAD0805	Q1003	SM275040092	BFT92R
L3502	SM654101000	SM0S	Q1004	SM289240062	BCV62
L4000	SM300486104	SM100uH	Q1005	SM275030092	BFT92
L4001	SM300486104	SM100uH	Q1006	SM275030093	BFT93
L4002	SM301502001	SMBEAD1206	Q1008	SM270130092	BFR92A
L4003	SM301502001	SMBEAD1206	Q1009	SM270130092	BFR92A
L4004	SM301502001	SMBEAD1206	Q1010	SM270130092	BFR92A
L4005	SM301502001	SMBEAD1206	Q1011	SM275330858	BC858C
L4006	SM301502001	SMBEAD1206	Q1012	SM270130092	BFR92A
L4500	SM669080181	SMBEAD0805	Q1013	SM270130092	BFR92A
L4501	SM669080181	SMBEAD0805	Q1014	SM270130092	BFR92A
L4502	SM654101000	SM0S	Q1015	SM270130092	BFR92A

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
Q1500	SM289240062	BCV62
Q1503	SM289240061	BCV61
Q2000	SM280120416	MMBF4416
Q2001	SM270130092	BFR92A
Q2002	SM270130092	BFR92A
Q2003	SM275040092	BFT92R
Q2004	SM289240062	BCV62
Q2005	SM275030092	BFT92
Q2006	SM275030093	BFT93
Q2008	SM270130092	BFR92A
Q2009	SM270130092	BFR92A
Q2010	SM270130092	BFR92A
Q2011	SM275330858	BC858C
Q2012	SM270130092	BFR92A
Q2013	SM270130092	BFR92A
Q2014	SM270130092	BFR92A
Q2015	SM270130092	BFR92A
Q2500	SM289240062	BCV62
Q2503	SM289240061	BCV61
Q3000	SM280120416	MMBF4416
Q3001	SM270130092	BFR92A
Q3002	SM270130092	BFR92A
Q3003	SM275040092	BFT92R
Q3004	SM289240062	BCV62
Q3005	SM275030092	BFT92
Q3006	SM275030093	BFT93
Q3008	SM270130092	BFR92A
Q3009	SM270130092	BFR92A
Q3010	SM270130092	BFR92A
Q3011	SM275330858	BC858C
Q3012	SM270130092	BFR92A
Q3013	SM270130092	BFR92A
Q3014	SM270130092	BFR92A
Q3015	SM270130092	BFR92A
Q3500	SM289240062	BCV62
Q3503	SM289240061	BCV61
Q4000	SM280120416	MMBF4416
Q4001	SM270130092	BFR92A
Q4002	SM270130092	BFR92A
Q4003	SM275040092	BFT92R
Q4004	SM289240062	BCV62
Q4005	SM275030092	BFT92
Q4006	SM275030093	BFT93
Q4008	SM270130092	BFR92A
Q4009	SM270130092	BFR92A
Q4010	SM270130092	BFR92A
Q4011	SM275330858	BC858C
Q4012	SM270130092	BFR92A
Q4013	SM270130092	BFR92A
Q4014	SM270130092	BFR92A
Q4015	SM270130092	BFR92A
Q4500	SM289240062	BCV62
Q4503	SM289240061	BCV61
Q5000	SM270130092	BFR92A
Q5001	SM280120416	MMBF4416
Q5002	SM270130093	BFR93A
Q5003	SM270140092	BFR92AR
Q5004	SM270130092	BFR92A
Q5005	SM270130092	BFR92A
Q6000	SM270130093	BFR93A
Q6001	SM275030550	BF550
Q6002	SM270130092	BFR92A
Q6003	SM270130093	BFR93A
Q6004	SM275030550	BF550
R1	SM652101103	SM10KS
R2	SM652101103	SM10KS
R3	SM652101103	SM10KS
R4	SM652101103	SM10KS
R5	SM652101103	SM10KS
R6	SM652101103	SM10KS
R7	SM652101103	SM10KS
R8	169416473	NTC-DISC-47K
R9	SM652101223	SM22KS
R10	SM652101103	SM10KS
R11	SM652101103	SM10KS
R12	SM652101512	SM5.1KS
R13	SM652101102	SM1KS
R14	SM652101332	SM3.3KS
R15	SM652101332	SM3.3KS
R16	SM652101102	SM1KS
R17	SM652101102	SM1KS
R18	SM652101332	SM3.3KS
R19	SM652101332	SM3.3KS
R20	SM652101102	SM1KS
R21	SM652101102	SM1KS
R22	SM652101102	SM1KS
R23	SM652101332	SM3.3KS
R24	SM652101102	SM1KS
R25	SM652101102	SM1KS
R26	SM652101302	SM3KS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
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R27	SM652101332	SM3.3KS	R218	SM652101103	SM10KS
R28	SM652101102	SM1KS	R219	SM652101103	SM10KS
R29	SM652101103	SM10KS	R220	SM652101103	SM10KS
R31	SM654101000	SM0S	R221	SM652101103	SM10KS
R32	SM652101102	SM1KS	R222	SM652101103	SM10KS
R33	SM652101102	SM1KS	R223	SM652101103	SM10KS
R34	SM652101103	SM10KS	R224	SM652101103	SM10KS
R35	SM652101102	SM1KS	R225	SM652101103	SM10KS
R36	SM652101102	SM1KS	R226	SM652101103	SM10KS
R37	SM652101220	SM22S	R227	SM652101750	SM75S
R38	SM652101103	SM10KS	R228	SM652101750	SM75S
R39	SM652101220	SM22S	R229	SM652101101	SM100S
R40	SM652101220	SM22S	R230	SM652101301	SM300S
R41	SM652101220	SM22S	R231	SM652101750	SM75S
R42	SM652101680	SM68S	R232	SM652101750	SM75S
R43	SM652101680	SM68S	R233	SM652101103	SM10KS
R44	SM652101680	SM68S	R234	SM652101103	SM10KS
R45	SM652101102	SM1KS	R235	SM652101301	SM300S
R46	SM652101103	SM10KS	R236	SM652101101	SM100S
R47	SM652101103	SM10KS	R245	SM185457101	SM100-1T
R48	SM652101103	SM10KS	R246	SM185457101	SM100-1T
R49	SM652101103	SM10KS	R400	SM652101201	SM200S
R52	SM652115062	SM6.2-1W	R401	SM652101201	SM200S
R54	SM652101103	SM10KS	R402	SM652101201	SM200S
R56	SM652101100	SM10S	R403	SM652101201	SM200S
R57	SM652101122	SM1.2KS	R404	SM652101121	SM120S
R58	SM652101220	SM22S	R405	SM652101121	SM120S
R200	SM652101103	SM10KS	R406	SM652101121	SM120S
R201	SM652101122	SM1.2KS	R407	SM652101121	SM120S
R202	SM652101103	SM10KS	R408	SM652101101	SM100S
R203	SM652101103	SM10KS	R409	SM652101181	SM180S
R204	SM652101510	SM51S	R410	SM652101101	SM100S
R205	SM652101102	SM1KS	R411	SM652101181	SM180S
R206	SM652101332	SM3.3KS	R415	SM652101331	SM330S
R207	SM652101824	SM820KS	R417	SM652101101	SM100S
R208	SM168659007	SM3.0K-1/oo	R418	SM652101750	SM75S
R209	SM168659004	SM900-1/oo	R507	SM652101102	SM1KS
R210	SM168659297	SM100-1/oo	R511	SM652101102	SM1KS
R211	SM652101153	SM15KS	R514	SM652101102	SM1KS
R212	SM652101152	SM1.5KS	R515	SM652101102	SM1KS
R213	SM652101332	SM3.3KS	R516	SM652101102	SM1KS
R214	SM652101103	SM10KS	R517	SM652101201	SM200S
R215	SM652101103	SM10KS	R518	SM652101201	SM200S
R216	SM652101103	SM10KS	R519	SM652101201	SM200S
R217	SM652101103	SM10KS	R520	SM652101201	SM200S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R521	SM652101121	SM120S
R522	SM652101121	SM120S
R523	SM652101121	SM120S
R524	SM652101121	SM120S
R525	SM652101201	SM200S
R526	SM652101201	SM200S
R527	SM652101121	SM120S
R528	SM652101121	SM120S
R529	SM652101102	SM1KS
R530	SM652101102	SM1KS
R550	SM652101621	SM620S
R551	SM652101621	SM620S
R552	SM652101153	SM15KS
R553	SM652101751	SM750S
R554	SM652101223	SM22KS
R556	SM652101153	SM15KS
R557	SM652101751	SM750S
R558	SM652101223	SM22KS
R562	SM652101121	SM120S
R563	SM652101121	SM120S
R564	SM652101201	SM200S
R565	SM652101201	SM200S
R566	SM652101121	SM120S
R567	SM652101121	SM120S
R568	SM652101201	SM200S
R569	SM652101201	SM200S
R570	SM652101103	SM10KS
R571	SM652101103	SM10KS
R572	SM652101103	SM10KS
R573	SM652101103	SM10KS
R574	SM652101103	SM10KS
R575	SM652101103	SM10KS
R578	SM652101103	SM10KS
R579	SM652101103	SM10KS
R607	SM652101102	SM1KS
R611	SM652101102	SM1KS
R614	SM652101102	SM1KS
R615	SM652101102	SM1KS
R616	SM652101102	SM1KS
R617	SM652101121	SM120S
R618	SM652101121	SM120S
R619	SM652101201	SM200S
R620	SM652101201	SM200S
R621	SM652101201	SM200S
R622	SM652101201	SM200S
R623	SM652101121	SM120S
R624	SM652101121	SM120S
R625	SM652101201	SM200S
R626	SM652101201	SM200S
R627	SM652101121	SM120S
R628	SM652101121	SM120S
R629	SM652101102	SM1KS
R630	SM652101102	SM1KS
R650	SM652101621	SM620S
R651	SM652101621	SM620S
R652	SM652101153	SM15KS
R653	SM652101751	SM750S
R654	SM652101223	SM22KS
R656	SM652101153	SM15KS
R657	SM652101751	SM750S
R658	SM652101223	SM22KS
R662	SM652101121	SM120S
R663	SM652101121	SM120S
R664	SM652101201	SM200S
R665	SM652101201	SM200S
R666	SM652101121	SM120S
R667	SM652101121	SM120S
R668	SM652101201	SM200S
R669	SM652101201	SM200S
R670	SM652101103	SM10KS
R671	SM652101103	SM10KS
R672	SM652101103	SM10KS
R673	SM652101103	SM10KS
R674	SM652101103	SM10KS
R675	SM652101103	SM10KS
R678	SM652101103	SM10KS
R679	SM652101103	SM10KS
R701	SM652101131	SM130S
R702	SM652101181	SM180S
R703	SM652101181	SM180S
R704	SM652101391	SM390S
R705	SM652101131	SM130S
R706	SM652101181	SM180S
R707	SM652101181	SM180S
R708	SM652101131	SM130S
R709	SM652101102	SM1KS
R710	SM652101220	SM22S
R711	SM652101131	SM130S
R712	SM652101131	SM130S
R713	SM652101102	SM1KS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R714	SM652101181	SM180S
R715	SM652101181	SM180S
R716	SM652101131	SM130S
R717	SM652101391	SM390S
R718	SM652101820	SM82S
R719	SM652101181	SM180S
R720	SM652101181	SM180S
R721	SM652101181	SM180S
R722	SM652101181	SM180S
R723	SM652101131	SM130S
R724	SM652101131	SM130S
R725	SM652101131	SM130S
R726	SM652101131	SM130S
R727	SM652101471	SM470S
R728	SM652101391	SM390S
R729	SM652101181	SM180S
R730	SM652101181	SM180S
R731	SM652101181	SM180S
R732	SM652101181	SM180S
R733	SM652101181	SM180S
R734	SM652101181	SM180S
R735	SM652101680	SM68S
R736	SM652101271	SM270S
R737	SM652101271	SM270S
R738	SM652101181	SM180S
R739	SM652101181	SM180S
R740	SM652101181	SM180S
R741	SM652101181	SM180S
R742	SM652101102	SM1KS
R743	SM652101102	SM1KS
R744	SM652101102	SM1KS
R745	SM652101471	SM470S
R746	SM652101471	SM470S
R747	SM652101471	SM470S
R748	SM652101471	SM470S
R749	SM652101181	SM180S
R750	SM652101181	SM180S
R751	SM652101181	SM180S
R752	SM652101181	SM180S
R753	SM652101121	SM120S
R754	SM652101121	SM120S
R755	SM652101181	SM180S
R756	SM652101181	SM180S
R757	SM652101181	SM180S
R758	SM652101181	SM180S
R759	SM652101750	SM75S
R760	SM652101911	SM910S
R761	SM652101102	SM1KS
R762	SM652101201	SM200S
R763	SM652101201	SM200S
R764	SM652101510	SM51S
R765	SM652101391	SM390S
R766	SM652101471	SM470S
R767	SM652101680	SM68S
R768	SM652101181	SM180S
R769	SM652101181	SM180S
R770	SM652101181	SM180S
R771	SM652101181	SM180S
R772	SM652101181	SM180S
R773	SM652101512	SM5.1KS
R775	SM652101181	SM180S
R776	SM652101181	SM180S
R777	SM652101471	SM470S
R778	SM652101181	SM180S
R779	SM652101181	SM180S
R781	SM652101181	SM180S
R782	SM652101181	SM180S
R783	SM652101101	SM100S
R784	SM652101220	SM22S
R785	SM652101220	SM22S
R786	SM652101181	SM180S
R787	SM652101181	SM180S
R788	SM652101101	SM100S
R789	SM652101220	SM22S
R790	SM652101181	SM180S
R791	SM652101181	SM180S
R792	SM652101181	SM180S
R793	SM652101181	SM180S
R794	SM652101181	SM180S
R795	SM652101220	SM22S
R797	SM652101181	SM180S
R799	SM652101181	SM180S
R800	SM652101181	SM180S
R801	SM652101181	SM180S
R802	SM652101181	SM180S
R803	SM652101131	SM130S
R804	SM652101181	SM180S
R805	SM652101181	SM180S
R806	SM652101181	SM180S
R807	SM652101181	SM180S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
R808	SM652101131	SM130S	R870	SM652101112	SM1.1KS
R809	SM652101181	SM180S	R871	SM652101510	SM51S
R812	SM652101471	SM470S	R872	SM652101103	SM10KS
R813	SM652101181	SM180S	R873	SM652101510	SM51S
R814	SM652101181	SM180S	R874	SM652101181	SM180S
R820	SM652101181	SM180S	R877	SM652101471	SM470S
R821	SM652101202	SM2KS	R878	SM652101471	SM470S
R822	SM652101820	SM82S	R879	SM651104204	SM200K-25PPM
R823	SM652101131	SM130S	R880	SM652101751	SM750S
R824	SM652101181	SM180S	R881	SM652101152	SM1.5KS
R826	SM652101391	SM390S	R882	SM652101101	SM100S
R827	SM652101510	SM51S	R883	SM652101101	SM100S
R829	SM652101181	SM180S	R885	SM652101181	SM180S
R830	SM652101181	SM180S	R886	SM652101101	SM100S
R832	SM652101181	SM180S	R887	SM652101471	SM470S
R833	SM652101181	SM180S	R888	SM652101471	SM470S
R834	SM652101821	SM820S	R889	SM652101471	SM470S
R835	SM652101751	SM750S	R890	SM652101102	SM1KS
R836	SM652101181	SM180S	R891	SM652101152	SM1.5KS
R837	SM652101181	SM180S	R892	SM652101131	SM130S
R838	SM652101181	SM180S	R893	SM652101751	SM750S
R840	SM652101510	SM51S	R894	SM652101101	SM100S
R841	SM652101510	SM51S	R895	SM652101240	SM24S
R842	SM652101510	SM51S	R897	SM652101102	SM1KS
R843	SM652101181	SM180S	R898	SM651104241	SM240-25PPM
R844	SM652101181	SM180S	R899	SM651104392	SM3.9K-25PPM
R845	SM652101181	SM180S	R900	SM652101101	SM100S
R847	SM652101102	SM1KS	R901	SM652101751	SM750S
R848	SM652101102	SM1KS	R902	SM652101751	SM750S
R849	SM652101181	SM180S	R903	SM652101102	SM1KS
R850	SM652101471	SM470S	R904	SM652101102	SM1KS
R851	SM652101102	SM1KS	R905	SM651104183	SM18K-25PPM
R852	SM652101102	SM1KS	R906	SM651104182	SM1.8K-25PPM
R855	SM652101471	SM470S	R907	SM651104201	SM200-25PPM
R857	SM652101510	SM51S	R908	SM185457201	SM200-1T
R858	SM652101103	SM10KS	R909	SM652101181	SM180S
R859	SM652101510	SM51S	R910	SM652101181	SM180S
R861	SM652101510	SM51S	R911	SM652101181	SM180S
R862	SM652101510	SM51S	R912	SM652101181	SM180S
R863	SM652101510	SM51S	R913	SM652101750	SM75S
R864	SM652101471	SM470S	R914	SM652101510	SM51S
R865	SM652101512	SM5.1KS	R915	SM652101271	SM270S
R866	SM652101562	SM5.6KS	R916	SM652101221	SM220S
R867	SM652101510	SM51S	R918	SM652101301	SM300S
R869	SM652101181	SM180S	R919	SM652101391	SM390S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R920	SM652101181	SM180S
R921	SM652101181	SM180S
R923	SM652101750	SM75S
R924	SM652101220	SM22S
R925	SM652101220	SM22S
R926	SM652101512	SM5.1KS
R927	SM652101562	SM5.6KS
R929	SM652101103	SM10KS
R935	SM652101181	SM180S
R936	SM652101181	SM180S
R937	SM652101181	SM180S
R938	SM652101181	SM180S
R939	SM652101181	SM180S
R940	SM652101181	SM180S
R941	SM652101181	SM180S
R942	SM652101181	SM180S
R943	SM652101181	SM180S
R944	SM652101181	SM180S
R945	SM652101512	SM5.1KS
R946	SM652101562	SM5.6KS
R947	SM652101181	SM180S
R948	SM652101181	SM180S
R950	SM652101221	SM220S
R951	SM652101221	SM220S
R952	SM652101221	SM220S
R953	SM652101221	SM220S
R954	SM652101221	SM220S
R955	SM652101221	SM220S
R956	SM652101221	SM220S
R957	SM652101221	SM220S
R958	SM652101221	SM220S
R959	SM652101221	SM220S
R960	SM652101112	SM1.1KS
R963	SM652101181	SM180S
R964	SM652101181	SM180S
R965	SM652101181	SM180S
R966	SM652101181	SM180S
R967	SM652101181	SM180S
R968	SM652101181	SM180S
R969	SM652101181	SM180S
R970	SM652101181	SM180S
R971	SM652101181	SM180S
R972	SM652101471	SM470S
R973	SM652101471	SM470S
R974	SM652101471	SM470S
R975	SM652101471	SM470S
R976	SM652101471	SM470S
R977	SM652101510	SM51S
R978	SM652101391	SM390S
R979	SM652101510	SM51S
R980	SM652101391	SM390S
R981	SM652101471	SM470S
R982	SM652101471	SM470S
R983	SM652101510	SM51S
R984	SM652101391	SM390S
R985	SM652101510	SM51S
R986	SM652101181	SM180S
R987	SM652101181	SM180S
R988	SM652101823	SM82KS
R989	SM652101181	SM180S
R990	SM652101512	SM5.1KS
R991	SM652101562	SM5.6KS
R1000	SM652101330	SM33S
R1001	SM652101391	SM390S
R1002	SM652101392	SM3.9KS
R1003	SM652101105	SM1MS
R1004	SM652101332	SM3.3KS
R1005	SM652113954	SM950K-3/oo
R1006	SM652101181	SM180S
R1007	SM168651297	SM100-1%MM
R1008	SM652101822	SM8.2KS
R1009	SM652101683	SM68KS
R1010	SM185457502	SM5K-1T
R1011	SM652101101	SM100S
R1012	SM652101360	SM36S
R1013	SM652101220	SM22S
R1014	SM168651297	SM100-1%MM
R1016	SM652113523	SM52.63K-3/oo
R1017	SM652101101	SM100S
R1018	SM652101114	SM110KS
R1019	SM652110904	SM900K-5/oo
R1020	SM652101272	SM2.7KS
R1021	SM652101512	SM5.1KS
R1022	SM652101390	SM39S
R1023	SM652101475	SM4.7MS
R1024	SM652101122	SM1.2KS
R1025	SM652101221	SM220S
R1026	SM652101105	SM1MS
R1027	SM652101105	SM1MS
R1028	SM652101220	SM22S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R1029	SM652101151	SM150S
R1030	SM652101512	SM5.1KS
R1031	SM652101512	SM5.1KS
R1032	SM652101101	SM100S
R1033	SM652101185	SM1.8MS
R1034	SM652101334	SM330KS
R1035	SM652101101	SM100S
R1036	SM652101333	SM33KS
R1037	SM652101103	SM10KS
R1038	SM652101220	SM22S
R1039	SM652101511	SM510S
R1040	SM652101331	SM330S
R1041	SM185457103	SM10K-1T
R1042	SM652101103	SM10KS
R1043	SM652101913	SM91KS
R1044	SM652101182	SM1.8KS
R1045	SM652101163	SM16KS
R1046	SM652101122	SM1.2KS
R1047	SM652101101	SM100S
R1048	SM652101470	SM47S
R1049	SM652101470	SM47S
R1050	SM652101240	SM24S
R1051	SM652101101	SM100S
R1052	SM652101223	SM22KS
R1053	SM652101822	SM8.2KS
R1054	SM652101100	SM10S
R1055	SM652101471	SM470S
R1056	SM652101471	SM470S
R1057	SM652101750	SM75S
R1058	SM652101240	SM24S
R1059	SM652101100	SM10S
R1060	SM652101100	SM10S
R1061	SM652101240	SM24S
R1062	SM652101120	SM12S
R1064	SM652101302	SM3KS
R1065	SM652101302	SM3KS
R1066	SM652101750	SM75S
R1067	SM652101510	SM51S
R1068	SM652101220	SM22S
R1069	SM652101330	SM33S
R1070	SM652101301	SM300S
R1071	SM652101301	SM300S
R1073	SM652101101	SM100S
R1074	SM652101301	SM300S
R1075	SM652101301	SM300S
R1076	SM652101100	SM10S
R1077	SM652101100	SM10S
R1078	SM652101301	SM300S
R1080	SM652101101	SM100S
R1081	SM652101152	SM1.5KS
R1082	SM652101562	SM5.6KS
R1083	SM652101750	SM75S
R1084	SM185457203	SM20K-1T
R1085	SM652101152	SM1.5KS
R1086	SM652101302	SM3KS
R1087	SM652101221	SM220S
R1088	SM652101103	SM10KS
R1089	SM652101103	SM10KS
R1090	SM652101221	SM220S
R1091	SM652101103	SM10KS
R1092	SM652101105	SM1MS
R1093	SM652101105	SM1MS
R1094	SM652101103	SM10KS
R1095	SM652101221	SM220S
R1096	SM652101105	SM1MS
R1097	SM652101105	SM1MS
R1098	SM652101221	SM220S
R1099	SM652101100	SM10S
R1100	SM652101512	SM5.1KS
R1101	SM652101470	SM47S
R1102	SM652101470	SM47S
R1506	SM652101510	SM51S
R1508	SM652101153	SM15KS
R1510	SM652101750	SM75S
R1513	SM652101103	SM10KS
R1514	SM652101122	SM1.2KS
R1515	SM185457501	SM500-1T
R1516	SM653206222	SMNTC-2.2K
R1517	SM652101122	SM1.2KS
R1518	SM185457502	SM5K-1T
R1519	SM652101822	SM8.2KS
R1520	SM652101103	SM10KS
R1521	SM652101151	SM150S
R1522	SM652101151	SM150S
R1523	SM652101201	SM200S
R1524	SM652101201	SM200S
R1525	SM652101201	SM200S
R1526	SM652101201	SM200S
R1527	SM652101680	SM68S
R1528	SM652101680	SM68S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
R1529	SM654101000	SM0S	R1577	SM185457102	SM1K-1T
R1530	SM652101201	SM200S	R1579	SM652101182	SM1.8KS
R1531	SM652101201	SM200S	R1580	SM653206222	SMNTC-2.2K
R1532	SM652101151	SM150S	R2000	SM652101330	SM33S
R1533	SM652101151	SM150S	R2001	SM652101391	SM390S
R1534	SM652101220	SM22S	R2002	SM652101392	SM3.9KS
R1535	SM652101750	SM75S	R2003	SM652101105	SM1MS
R1536	SM652101151	SM150S	R2004	SM652101332	SM3.3KS
R1537	SM652101151	SM150S	R2005	SM652113954	SM950K-3/oo
R1538	SM652101201	SM200S	R2006	SM652101181	SM180S
R1539	SM652101201	SM200S	R2007	SM168651297	SM100-1%MM
R1540	SM652101182	SM1.8KS	R2008	SM652101822	SM8.2KS
R1541	SM652101103	SM10KS	R2009	SM652101683	SM68KS
R1542	SM652101101	SM100S	R2010	SM185457502	SM5K-1T
R1544	SM654101000	SM0S	R2011	SM652101101	SM100S
R1545	SM652101431	SM430S	R2012	SM652101360	SM36S
R1546	SM652101431	SM430S	R2013	SM652101220	SM22S
R1547	SM652101431	SM430S	R2014	SM168651297	SM100-1%MM
R1548	SM652101431	SM430S	R2016	SM652113523	SM52.63K-3/oo
R1549	SM652101431	SM430S	R2017	SM652101101	SM100S
R1550	SM652101431	SM430S	R2018	SM652101114	SM110KS
R1551	SM652101431	SM430S	R2019	SM652110904	SM900K-5/oo
R1552	SM652101431	SM430S	R2020	SM652101272	SM2.7KS
R1553	SM652101431	SM430S	R2021	SM652101512	SM5.1KS
R1554	SM652101910	SM91S	R2022	SM652101390	SM39S
R1555	SM652101910	SM91S	R2023	SM652101475	SM4.7MS
R1556	SM652101910	SM91S	R2024	SM652101122	SM1.2KS
R1557	SM652101910	SM91S	R2025	SM652101221	SM220S
R1558	SM652101910	SM91S	R2026	SM652101105	SM1MS
R1559	SM652101910	SM91S	R2027	SM652101105	SM1MS
R1560	SM652101910	SM91S	R2028	SM652101220	SM22S
R1561	SM652101910	SM91S	R2029	SM652101151	SM150S
R1562	SM652101910	SM91S	R2030	SM652101512	SM5.1KS
R1563	SM652101301	SM300S	R2031	SM652101512	SM5.1KS
R1564	SM652101301	SM300S	R2032	SM652101101	SM100S
R1567	SM652101201	SM200S	R2033	SM652101185	SM1.8MS
R1568	SM652101201	SM200S	R2034	SM652101334	SM330KS
R1569	SM652101151	SM150S	R2035	SM652101101	SM100S
R1570	SM652101151	SM150S	R2036	SM652101333	SM33KS
R1571	SM652101201	SM200S	R2037	SM652101103	SM10KS
R1572	SM652101201	SM200S	R2038	SM652101220	SM22S
R1573	SM185457501	SM500-1T	R2039	SM652101511	SM510S
R1574	SM652101472	SM4.7KS	R2040	SM652101331	SM330S
R1575	SM652101223	SM22KS	R2041	SM185457103	SM10K-1T
R1576	SM185457503	SM50K-1T	R2042	SM652101103	SM10KS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R2043	SM652101913	SM91KS
R2044	SM652101182	SM1.8KS
R2045	SM652101163	SM16KS
R2046	SM652101122	SM1.2KS
R2047	SM652101101	SM100S
R2048	SM652101470	SM47S
R2049	SM652101470	SM47S
R2050	SM652101240	SM24S
R2051	SM652101101	SM100S
R2052	SM652101223	SM22KS
R2053	SM652101822	SM8.2KS
R2054	SM652101100	SM10S
R2055	SM652101471	SM470S
R2056	SM652101471	SM470S
R2057	SM652101750	SM75S
R2058	SM652101240	SM24S
R2059	SM652101100	SM10S
R2060	SM652101100	SM10S
R2061	SM652101240	SM24S
R2062	SM652101120	SM12S
R2064	SM652101302	SM3KS
R2065	SM652101302	SM3KS
R2066	SM652101750	SM75S
R2067	SM652101510	SM51S
R2068	SM652101220	SM22S
R2069	SM652101330	SM33S
R2070	SM652101301	SM300S
R2071	SM652101301	SM300S
R2073	SM652101101	SM100S
R2074	SM652101301	SM300S
R2075	SM652101301	SM300S
R2076	SM652101100	SM10S
R2077	SM652101100	SM10S
R2078	SM652101301	SM300S
R2080	SM652101101	SM100S
R2081	SM652101152	SM1.5KS
R2082	SM652101562	SM5.6KS
R2083	SM652101750	SM75S
R2084	SM185457203	SM20K-1T
R2085	SM652101152	SM1.5KS
R2086	SM652101302	SM3KS
R2087	SM652101221	SM220S
R2088	SM652101103	SM10KS
R2089	SM652101103	SM10KS
R2090	SM652101221	SM220S
R2091	SM652101103	SM10KS
R2092	SM652101105	SM1MS
R2093	SM652101105	SM1MS
R2094	SM652101103	SM10KS
R2095	SM652101221	SM220S
R2096	SM652101105	SM1MS
R2097	SM652101105	SM1MS
R2098	SM652101221	SM220S
R2099	SM652101100	SM10S
R2100	SM652101512	SM5.1KS
R2101	SM652101470	SM47S
R2102	SM652101470	SM47S
R2506	SM652101510	SM51S
R2508	SM652101153	SM15KS
R2510	SM652101750	SM75S
R2513	SM652101103	SM10KS
R2514	SM652101122	SM1.2KS
R2515	SM185457501	SM500-1T
R2516	SM653206222	SMNTC-2.2K
R2517	SM652101122	SM1.2KS
R2518	SM185457502	SM5K-1T
R2519	SM652101822	SM8.2KS
R2520	SM652101103	SM10KS
R2521	SM652101151	SM150S
R2522	SM652101151	SM150S
R2523	SM652101201	SM200S
R2524	SM652101201	SM200S
R2525	SM652101201	SM200S
R2526	SM652101201	SM200S
R2527	SM652101680	SM68S
R2528	SM652101680	SM68S
R2529	SM654101000	SM0S
R2530	SM652101201	SM200S
R2531	SM652101201	SM200S
R2532	SM652101151	SM150S
R2533	SM652101151	SM150S
R2534	SM652101220	SM22S
R2535	SM652101750	SM75S
R2536	SM652101151	SM150S
R2537	SM652101151	SM150S
R2538	SM652101201	SM200S
R2539	SM652101201	SM200S
R2540	SM652101182	SM1.8KS
R2541	SM652101103	SM10KS
R2542	SM652101101	SM100S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R2544	SM654101000	SM0S
R2545	SM652101431	SM430S
R2546	SM652101431	SM430S
R2547	SM652101431	SM430S
R2548	SM652101431	SM430S
R2549	SM652101431	SM430S
R2550	SM652101431	SM430S
R2551	SM652101431	SM430S
R2552	SM652101431	SM430S
R2553	SM652101431	SM430S
R2554	SM652101910	SM91S
R2555	SM652101910	SM91S
R2556	SM652101910	SM91S
R2557	SM652101910	SM91S
R2558	SM652101910	SM91S
R2559	SM652101910	SM91S
R2560	SM652101910	SM91S
R2561	SM652101910	SM91S
R2562	SM652101910	SM91S
R2563	SM652101301	SM300S
R2564	SM652101301	SM300S
R2567	SM652101201	SM200S
R2568	SM652101201	SM200S
R2569	SM652101151	SM150S
R2570	SM652101151	SM150S
R2571	SM652101201	SM200S
R2572	SM652101201	SM200S
R2573	SM185457501	SM500-1T
R2574	SM652101472	SM4.7KS
R2575	SM652101223	SM22KS
R2576	SM185457503	SM50K-1T
R2577	SM185457102	SM1K-1T
R2579	SM652101182	SM1.8KS
R2580	SM653206222	SMNTC-2.2K
R3000	SM652101330	SM33S
R3001	SM652101391	SM390S
R3002	SM652101392	SM3.9KS
R3003	SM652101105	SM1MS
R3004	SM652101332	SM3.3KS
R3005	SM652113954	SM950K-3/oo
R3006	SM652101181	SM180S
R3007	SM168651297	SM100-1%MM
R3008	SM652101822	SM8.2KS
R3009	SM652101683	SM68KS
R3010	SM185457502	SM5K-1T
R3011	SM652101101	SM100S
R3012	SM652101360	SM36S
R3013	SM652101220	SM22S
R3014	SM168651297	SM100-1%MM
R3016	SM652113523	SM52.63K-3/oo
R3017	SM652101101	SM100S
R3018	SM652101114	SM110KS
R3019	SM652110904	SM900K-5/oo
R3020	SM652101272	SM2.7KS
R3021	SM652101512	SM5.1KS
R3022	SM652101390	SM39S
R3023	SM652101475	SM4.7MS
R3024	SM652101122	SM1.2KS
R3025	SM652101221	SM220S
R3026	SM652101105	SM1MS
R3027	SM652101105	SM1MS
R3028	SM652101220	SM22S
R3029	SM652101151	SM150S
R3030	SM652101512	SM5.1KS
R3031	SM652101512	SM5.1KS
R3032	SM652101101	SM100S
R3033	SM652101185	SM1.8MS
R3034	SM652101334	SM330KS
R3035	SM652101101	SM100S
R3036	SM652101333	SM33KS
R3037	SM652101103	SM10KS
R3038	SM652101220	SM22S
R3039	SM652101511	SM510S
R3040	SM652101331	SM330S
R3041	SM185457103	SM10K-1T
R3042	SM652101103	SM10KS
R3043	SM652101913	SM91KS
R3044	SM652101182	SM1.8KS
R3045	SM652101163	SM16KS
R3046	SM652101122	SM1.2KS
R3047	SM652101101	SM100S
R3048	SM652101470	SM47S
R3049	SM652101470	SM47S
R3050	SM652101240	SM24S
R3051	SM652101101	SM100S
R3052	SM652101223	SM22KS
R3053	SM652101822	SM8.2KS
R3054	SM652101100	SM10S
R3055	SM652101471	SM470S
R3056	SM652101471	SM470S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
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R3057	SM652101750	SM75S	R3510	SM652101750	SM75S
R3058	SM652101240	SM24S	R3513	SM652101103	SM10KS
R3059	SM652101100	SM10S	R3514	SM652101122	SM1.2KS
R3060	SM652101100	SM10S	R3515	SM185457501	SM500-1T
R3061	SM652101240	SM24S	R3516	SM653206222	SMNTC-2.2K
R3062	SM652101120	SM12S	R3517	SM652101122	SM1.2KS
R3064	SM652101302	SM3KS	R3518	SM185457502	SM5K-1T
R3065	SM652101302	SM3KS	R3519	SM652101822	SM8.2KS
R3066	SM652101750	SM75S	R3520	SM652101103	SM10KS
R3067	SM652101510	SM51S	R3521	SM652101151	SM150S
R3068	SM652101220	SM22S	R3522	SM652101151	SM150S
R3069	SM652101330	SM33S	R3523	SM652101201	SM200S
R3070	SM652101301	SM300S	R3524	SM652101201	SM200S
R3071	SM652101301	SM300S	R3525	SM652101201	SM200S
R3073	SM652101101	SM100S	R3526	SM652101201	SM200S
R3074	SM652101301	SM300S	R3527	SM652101680	SM68S
R3075	SM652101301	SM300S	R3528	SM652101680	SM68S
R3076	SM652101100	SM10S	R3529	SM654101000	SM0S
R3077	SM652101100	SM10S	R3530	SM652101201	SM200S
R3078	SM652101301	SM300S	R3531	SM652101201	SM200S
R3080	SM652101101	SM100S	R3532	SM652101151	SM150S
R3081	SM652101152	SM1.5KS	R3533	SM652101151	SM150S
R3082	SM652101562	SM5.6KS	R3534	SM652101220	SM22S
R3083	SM652101750	SM75S	R3535	SM652101750	SM75S
R3084	SM185457203	SM20K-1T	R3536	SM652101151	SM150S
R3085	SM652101152	SM1.5KS	R3537	SM652101151	SM150S
R3086	SM652101302	SM3KS	R3538	SM652101201	SM200S
R3087	SM652101221	SM220S	R3539	SM652101201	SM200S
R3088	SM652101103	SM10KS	R3540	SM652101182	SM1.8KS
R3089	SM652101103	SM10KS	R3541	SM652101103	SM10KS
R3090	SM652101221	SM220S	R3542	SM652101101	SM100S
R3091	SM652101103	SM10KS	R3544	SM654101000	SM0S
R3092	SM652101105	SM1MS	R3545	SM652101431	SM430S
R3093	SM652101105	SM1MS	R3546	SM652101431	SM430S
R3094	SM652101103	SM10KS	R3547	SM652101431	SM430S
R3095	SM652101221	SM220S	R3548	SM652101431	SM430S
R3096	SM652101105	SM1MS	R3549	SM652101431	SM430S
R3097	SM652101105	SM1MS	R3550	SM652101431	SM430S
R3098	SM652101221	SM220S	R3551	SM652101431	SM430S
R3099	SM652101100	SM10S	R3552	SM652101431	SM430S
R3100	SM652101512	SM5.1KS	R3553	SM652101431	SM430S
R3101	SM652101470	SM47S	R3554	SM652101910	SM91S
R3102	SM652101470	SM47S	R3555	SM652101910	SM91S
R3506	SM652101510	SM51S	R3556	SM652101910	SM91S
R3508	SM652101153	SM15KS	R3557	SM652101910	SM91S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R3558	SM652101910	SM91S
R3559	SM652101910	SM91S
R3560	SM652101910	SM91S
R3561	SM652101910	SM91S
R3562	SM652101910	SM91S
R3563	SM652101301	SM300S
R3564	SM652101301	SM300S
R3567	SM652101201	SM200S
R3568	SM652101201	SM200S
R3569	SM652101151	SM150S
R3570	SM652101151	SM150S
R3571	SM652101201	SM200S
R3572	SM652101201	SM200S
R3573	SM185457501	SM500-1T
R3574	SM652101472	SM4.7KS
R3575	SM652101223	SM22KS
R3576	SM185457503	SM50K-1T
R3577	SM185457102	SM1K-1T
R3579	SM652101182	SM1.8KS
R3580	SM653206222	SMNTC-2.2K
R4000	SM652101330	SM33S
R4001	SM652101391	SM390S
R4002	SM652101392	SM3.9KS
R4003	SM652101105	SM1MS
R4004	SM652101332	SM3.3KS
R4005	SM652113954	SM950K-3/oo
R4006	SM652101181	SM180S
R4007	SM168651297	SM100-1%MM
R4008	SM652101822	SM8.2KS
R4009	SM652101683	SM68KS
R4010	SM185457502	SM5K-1T
R4011	SM652101101	SM100S
R4012	SM652101360	SM36S
R4013	SM652101220	SM22S
R4014	SM168651297	SM100-1%MM
R4016	SM652113523	SM52.63K-3/oo
R4017	SM652101101	SM100S
R4018	SM652101114	SM110KS
R4019	SM652110904	SM900K-5/oo
R4020	SM652101272	SM2.7KS
R4021	SM652101512	SM5.1KS
R4022	SM652101390	SM39S
R4023	SM652101475	SM4.7MS
R4024	SM652101122	SM1.2KS
R4025	SM652101221	SM220S
R4026	SM652101105	SM1MS
R4027	SM652101105	SM1MS
R4028	SM652101220	SM22S
R4029	SM652101151	SM150S
R4030	SM652101512	SM5.1KS
R4031	SM652101512	SM5.1KS
R4032	SM652101101	SM100S
R4033	SM652101185	SM1.8MS
R4034	SM652101334	SM330KS
R4035	SM652101101	SM100S
R4036	SM652101333	SM33KS
R4037	SM652101103	SM10KS
R4038	SM652101220	SM22S
R4039	SM652101511	SM510S
R4040	SM652101331	SM330S
R4041	SM185457103	SM10K-1T
R4042	SM652101103	SM10KS
R4043	SM652101913	SM91KS
R4044	SM652101182	SM1.8KS
R4045	SM652101163	SM16KS
R4046	SM652101122	SM1.2KS
R4047	SM652101101	SM100S
R4048	SM652101470	SM47S
R4049	SM652101470	SM47S
R4050	SM652101240	SM24S
R4051	SM652101101	SM100S
R4052	SM652101223	SM22KS
R4053	SM652101822	SM8.2KS
R4054	SM652101100	SM10S
R4055	SM652101471	SM470S
R4056	SM652101471	SM470S
R4057	SM652101750	SM75S
R4058	SM652101240	SM24S
R4059	SM652101100	SM10S
R4060	SM652101100	SM10S
R4061	SM652101240	SM24S
R4062	SM652101120	SM12S
R4064	SM652101302	SM3KS
R4065	SM652101302	SM3KS
R4066	SM652101750	SM75S
R4067	SM652101510	SM51S
R4068	SM652101220	SM22S
R4069	SM652101330	SM33S
R4070	SM652101301	SM300S
R4071	SM652101301	SM300S

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
R4073	SM652101101	SM100S	R4526	SM652101201	SM200S
R4074	SM652101301	SM300S	R4527	SM652101680	SM68S
R4075	SM652101301	SM300S	R4528	SM652101680	SM68S
R4076	SM652101100	SM10S	R4529	SM654101000	SM0S
R4077	SM652101100	SM10S	R4530	SM652101201	SM200S
R4078	SM652101301	SM300S	R4531	SM652101201	SM200S
R4080	SM652101101	SM100S	R4532	SM652101151	SM150S
R4081	SM652101152	SM1.5KS	R4533	SM652101151	SM150S
R4082	SM652101562	SM5.6KS	R4534	SM652101220	SM22S
R4083	SM652101750	SM75S	R4535	SM652101750	SM75S
R4084	SM185457203	SM20K-1T	R4536	SM652101151	SM150S
R4085	SM652101152	SM1.5KS	R4537	SM652101151	SM150S
R4086	SM652101302	SM3KS	R4538	SM652101201	SM200S
R4087	SM652101221	SM220S	R4539	SM652101201	SM200S
R4088	SM652101103	SM10KS	R4540	SM652101182	SM1.8KS
R4089	SM652101103	SM10KS	R4541	SM652101103	SM10KS
R4090	SM652101221	SM220S	R4542	SM652101101	SM100S
R4091	SM652101103	SM10KS	R4544	SM654101000	SM0S
R4092	SM652101105	SM1MS	R4545	SM652101431	SM430S
R4093	SM652101105	SM1MS	R4546	SM652101431	SM430S
R4094	SM652101103	SM10KS	R4547	SM652101431	SM430S
R4095	SM652101221	SM220S	R4548	SM652101431	SM430S
R4096	SM652101105	SM1MS	R4549	SM652101431	SM430S
R4097	SM652101105	SM1MS	R4550	SM652101431	SM430S
R4098	SM652101221	SM220S	R4551	SM652101431	SM430S
R4099	SM652101100	SM10S	R4552	SM652101431	SM430S
R4100	SM652101512	SM5.1KS	R4553	SM652101431	SM430S
R4101	SM652101470	SM47S	R4554	SM652101910	SM91S
R4102	SM652101470	SM47S	R4555	SM652101910	SM91S
R4506	SM652101510	SM51S	R4556	SM652101910	SM91S
R4508	SM652101153	SM15KS	R4557	SM652101910	SM91S
R4510	SM652101750	SM75S	R4558	SM652101910	SM91S
R4513	SM652101103	SM10KS	R4559	SM652101910	SM91S
R4514	SM652101122	SM1.2KS	R4560	SM652101910	SM91S
R4515	SM185457501	SM500-1T	R4561	SM652101910	SM91S
R4516	SM653206222	SMNTC-2.2K	R4562	SM652101910	SM91S
R4517	SM652101122	SM1.2KS	R4563	SM652101301	SM300S
R4518	SM185457502	SM5K-1T	R4564	SM652101301	SM300S
R4519	SM652101822	SM8.2KS	R4567	SM652101201	SM200S
R4520	SM652101103	SM10KS	R4568	SM652101201	SM200S
R4521	SM652101151	SM150S	R4569	SM652101151	SM150S
R4522	SM652101151	SM150S	R4570	SM652101151	SM150S
R4523	SM652101201	SM200S	R4571	SM652101201	SM200S
R4524	SM652101201	SM200S	R4572	SM652101201	SM200S
R4525	SM652101201	SM200S	R4573	SM185457501	SM500-1T

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R4574	SM652101472	SM4.7KS
R4575	SM652101223	SM22KS
R4576	SM185457503	SM50K-1T
R4577	SM185457102	SM1K-1T
R4579	SM652101182	SM1.8KS
R4580	SM653206222	SMNTC-2.2K
R5000	SM652101330	SM33S
R5001	SM652101220	SM22S
R5002	SM652101100	SM10S
R5003	SM652101330	SM33S
R5004	SM652101330	SM33S
R5005	SM652101104	SM100KS
R5006	SM652110904	SM900K-5/oo
R5007	SM652101101	SM100S
R5008	SM652101182	SM1.8KS
R5009	SM652101272	SM2.7KS
R5010	SM652110904	SM900K-5/oo
R5011	SM652101510	SM51S
R5012	SM652101182	SM1.8KS
R5013	SM652101122	SM1.2KS
R5014	SM652101221	SM220S
R5015	SM652101475	SM4.7MS
R5016	SM168659006	SM111.1K-1/oo
R5017	SM652101153	SM15KS
R5018	SM652101183	SM18KS
R5019	SM185457201	SM200-1T
R5020	SM652101101	SM100S
R5021	SM652101151	SM150S
R5022	SM652101680	SM68S
R5023	SM652101474	SM470KS
R5024	SM652101684	SM680KS
R5025	SM652101103	SM10KS
R5026	SM652101104	SM100KS
R5027	SM652101330	SM33S
R5028	SM652101391	SM390S
R5029	SM652110904	SM900K-5/oo
R5030	SM652101101	SM100S
R5031	SM652101331	SM330S
R5032	SM652101103	SM10KS
R5033	SM652101680	SM68S
R5034	SM652101100	SM10S
R5035	SM652101471	SM470S
R5036	SM652101101	SM100S
R5038	SM652101824	SM820KS
R5039	SM652101510	SM51S

Location	Part Number	Description
R5040	SM652101182	SM1.8KS
R5041	SM652101510	SM51S
R5042	SM652101182	SM1.8KS
R5043	SM652101330	SM33S
R5044	SM652101330	SM33S
R5045	SM652101561	SM560S
R5046	SM652101101	SM100S
R5047	SM652101330	SM33S
R5048	SM652101330	SM33S
R5049	SM652101561	SM560S
R5050	SM652101101	SM100S
R5051	SM652101512	SM5.1KS
R5052	SM652101163	SM16KS
R5053	SM185457203	SM20K-1T
R5054	SM652101163	SM16KS
R5055	SM185457203	SM20K-1T
R5056	SM652101332	SM3.3KS
R5057	SM654101000	SM0S
R5060	SM654101000	SM0S
R5061	SM652101332	SM3.3KS
R5062	SM652101332	SM3.3KS
R5064	SM654101000	SM0S
R5066	SM654101000	SM0S
R5067	SM652101332	SM3.3KS
R5068	SM652101512	SM5.1KS
R5071	SM652101510	SM51S
R5072	SM652101510	SM51S
R5073	SM652101182	SM1.8KS
R5074	SM652101182	SM1.8KS
R5075	SM652101561	SM560S
R5076	SM652101561	SM560S
R5077	SM652101163	SM16KS
R5078	SM185457203	SM20K-1T
R5079	SM652101163	SM16KS
R5080	SM185457203	SM20K-1T
R5081	SM652101332	SM3.3KS
R5082	SM654101000	SM0S
R5084	SM654101000	SM0S
R5086	SM652101332	SM3.3KS
R5087	SM652101512	SM5.1KS
R5088	SM652101332	SM3.3KS
R5089	SM654101000	SM0S
R5091	SM654101000	SM0S
R5093	SM652101332	SM3.3KS
R5094	SM652101512	SM5.1KS

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
R5095	SM652101510	SM51S
R5096	SM652101561	SM560S
R5097	SM652101182	SM1.8KS
R5098	SM652101101	SM100S
R5099	SM652101561	SM560S
R5100	SM652101271	SM270S
R5101	SM652101101	SM100S
R5102	SM652101561	SM560S
R5103	SM652101163	SM16KS
R5104	SM652101221	SM220S
R5105	SM652101391	SM390S
R5106	SM652101471	SM470S
R5107	SM652101512	SM5.1KS
R5108	SM185457203	SM20K-1T
R5109	SM652101471	SM470S
R5110	SM652101512	SM5.1KS
R5111	SM652101512	SM5.1KS
R5112	SM652101332	SM3.3KS
R5113	SM654101000	SM0S
R5115	SM654101000	SM0S
R5117	SM652101332	SM3.3KS
R5118	SM652101512	SM5.1KS
R5119	SM652101562	SM5.6KS
R5120	SM652101562	SM5.6KS
R5121	SM652101512	SM5.1KS
R5122	SM652101562	SM5.6KS
R5123	SM652101562	SM5.6KS
R5124	SM652101241	SM240S
R5125	SM652101271	SM270S
R5126	SM168651297	SM100-1%MM
R5127	SM168651297	SM100-1%MM
R5128	SM652101202	SM2KS
R5129	SM185457502	SM5K-1T
R5130	SM652101683	SM68KS
R5131	SM652101392	SM3.9KS
R5132	SM652101105	SM1MS
R5133	SM652101512	SM5.1KS
R5134	SM652101512	SM5.1KS
R5135	SM652101512	SM5.1KS
R5136	SM652101822	SM8.2KS
R5137	SM652101332	SM3.3KS
R5141	SM652101512	SM5.1KS
R5142	SM652101512	SM5.1KS
R6000	SM652101330	SM33S
R6001	SM168659007	SM3.0K-1/oo
R6002	SM168659297	SM100-1/oo
R6003	SM168659297	SM100-1/oo
R6004	SM652101331	SM330S
R6005	SM652101112	SM1.1KS
R6006	SM652101330	SM33S
R6007	SM652101181	SM180S
R6008	SM652101112	SM1.1KS
R6009	SM652101621	SM620S
R6010	SM652101512	SM5.1KS
R6011	SM652101512	SM5.1KS
R6012	SM652101131	SM130S
R6013	SM652101391	SM390S
R6014	SM168659007	SM3.0K-1/oo
R6015	SM168659007	SM3.0K-1/oo
R6016	SM168659004	SM900-1/oo
R6017	SM168659297	SM100-1/oo
R6018	SM652101392	SM3.9KS
R6019	SM652101112	SM1.1KS
R6020	SM168659007	SM3.0K-1/oo
R6021	SM652101220	SM22S
R6022	SM652101101	SM100S
R6023	SM652101101	SM100S
S1	SM654101000	SM0S-2P
S5	SM654101000	SM0S-2P
S6	SM654101000	SM0S-2P
S7	SM654101000	SM0S-2P
Y700	311210000	OSC-18D-10MHz
Y5000	SM310900015	SM15.5029MHz
BZ700	530040007	TMB-05
CR1	SM236030099	BAV99
CR2	SM232120070	BAV70
CR100	SM253032823	HSMS2823
CR200	SM240218451	BZX84-C5V1
CR201	SM240218475	BZX84-C7V5
CR202	SM240218475	BZX84-C7V5
CR400	SM236654004	SM4004
CR401	SM236654004	SM4004
CR402	SM236654004	SM4004
CR410	SM253032823	HSMS2823
CR411	SM253032823	HSMS2823
CR412	SM253032823	HSMS2823
CR413	SM253032823	HSMS2823
CR414	SM253032823	HSMS2823
CR415	SM253032823	HSMS2823
CR416	SM253032823	HSMS2823

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description
CR417	SM253032823	HSMS2823
CR418	SM253032823	HSMS2823
CR501	SM236030099	BAV99
CR503	SM240218451	BZX84-C5V1
CR504	SM240218451	BZX84-C5V1
CR505	SM240218451	BZX84-C5V1
CR507	SM240218451	BZX84-C5V1
CR508	SM240218451	BZX84-C5V1
CR601	SM236030099	BAV99
CR603	SM240218451	BZX84-C5V1
CR604	SM240218451	BZX84-C5V1
CR605	SM240218451	BZX84-C5V1
CR607	SM240218451	BZX84-C5V1
CR608	SM240218451	BZX84-C5V1
CR700	SM240218451	BZX84-C5V1
CR701	SM236030099	BAV99
CR702	SM240218451	BZX84-C5V1
CR703	SM240218451	BZX84-C5V1
CR704	SM240218451	BZX84-C5V1
CR705	SM236654004	SM4004
CR707	SM252080682	BA682
CR708	SM252080682	BA682
CR710	SM252080682	BA682
CR713	SM236030099	BAV99
CR716	SM236030099	BAV99
CR717	SM252080682	BA682
CR718	SM252080682	BA682
CR719	SM240218451	BZX84-C5V1
CR720	SM240218451	BZX84-C5V1
CR721	SM240218451	BZX84-C5V1
CR722	SM240218451	BZX84-C5V1
CR723	SM232022822	HSMS2822
CR724	SM236030099	BAV99
CR725	SM232022822	HSMS2822
CR730	SM236030099	BAV99
CR731	SM236030099	BAV99
CR732	SM236030099	BAV99
CR733	SM236030099	BAV99
CR1000	SM229020150	SMTVSS-5V6
CR1001	SM236030099	BAV99
CR1002	SM236030099	BAV99
CR1003	SM236030099	BAV99
CR1004	SM252023018	BAT18
CR1005	SM240050056	TZMC5V6
CR1500	SM240050051	TZMC5V1
CR1501	SM240050051	TZMC5V1
CR2000	SM229020150	SMTVSS-5V6
CR2001	SM236030099	BAV99
CR2002	SM236030099	BAV99
CR2003	SM236030099	BAV99
CR2004	SM252023018	BAT18
CR2005	SM240050056	TZMC5V6
CR2500	SM240050051	TZMC5V1
CR2501	SM240050051	TZMC5V1
CR3000	SM229020150	SMTVSS-5V6
CR3001	SM236030099	BAV99
CR3002	SM236030099	BAV99
CR3003	SM236030099	BAV99
CR3004	SM252023018	BAT18
CR3005	SM240050056	TZMC5V6
CR3500	SM240050051	TZMC5V1
CR3501	SM240050051	TZMC5V1
CR4000	SM229020150	SMTVSS-5V6
CR4001	SM236030099	BAV99
CR4002	SM236030099	BAV99
CR4003	SM236030099	BAV99
CR4004	SM252023018	BAT18
CR4005	SM240050056	TZMC5V6
CR4500	SM240050051	TZMC5V1
CR4501	SM240050051	TZMC5V1
CR5000	SM229020150	SMTVSS-5V6
CR5001	SM252023018	BAT18
CR5002	SM232120070	BAV70
CR5003	SM236030099	BAV99
CR5004	SM240050033	TZMC3V3
CR5005	SM240050033	TZMC3V3
CR5006	SM240050033	TZMC3V3
CR5007	SM240050033	TZMC3V3
CR5008	SM240218451	BZX84-C5V1
CR5009	SM240050033	TZMC3V3
CR5010	SM232120070	BAV70
CR5011	SM236030099	BAV99
CR5012	SM236030099	BAV99
CR6000	SM229020150	SMTVSS-5V6
CR6001	SM253032823	HSMS2823
CR6002	SM232022822	HSMS2822
CR6003	SM240050051	TZMC5V1
CR6004	SM236030099	BAV99
DL700	290199015	DL-1L6-15
DL701	290199015	DL-1L6-15

PART: F9354-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

Location	Part Number	Description	Location	Part Number	Description
DL705	290120009	9nS	RL3001	430430002	RL-FBR22-12
DL706	290120004	4nS	RL3002	430441732	RL-732-12
DL707	290120002	2nS	RL3003	430430002	RL-FBR22-12
DL708	290120002	2nS	RL4000	430441732	RL-732-12
DL709	290120002	2nS	RL4001	430430002	RL-FBR22-12
DL710	290120009	9nS	RL4002	430441732	RL-732-12
DL711	290120002	2nS	RL4003	430430002	RL-FBR22-12
DL712	290120005	5nS	RL5000	430490003	RL-TQ2-12
RL200	430490750	RL-UR1-12	RL5001	430430002	RL-FBR22-12
RL201	SIMUL	SIMUL-RL-UR1	TP201	454313010	2x5-ST-M-NW-SP
RL202	SIMUL	SIMUL-RL-UR1	TP202	454313010	2x5-ST-M-NW-SP
RL203	430490750	RL-UR1-12	TP203	454313010	2x5-ST-M-NW-SP
RL1000	430441732	RL-732-12	TP1000	454340002	2x1-ST-M-NW
RL1001	430430002	RL-FBR22-12	TP1500	454311008	2x4-ST-M-NW
RL1002	430441732	RL-732-12	TP2000	454340002	2x1-ST-M-NW
RL1003	430430002	RL-FBR22-12	TP2500	454311008	2x4-ST-M-NW
RL2000	430441732	RL-732-12	TP3000	454340002	2x1-ST-M-NW
RL2001	430430002	RL-FBR22-12	TP3500	454311008	2x4-ST-M-NW
RL2002	430441732	RL-732-12	TP4000	454340002	2x1-ST-M-NW
RL2003	430430002	RL-FBR22-12	TP4500	454311008	2x4-ST-M-NW
RL3000	430441732	RL-732-12	TP5000	454340002	2x1-ST-M-NW

PART: F9354-31 DESC: DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
146544471	CAP MINI ALUM 20% 470UF	1
146554476	CAP MINI ALUM 20% 47 UF	2
146574227	CAP MINI ALUM 20% 220 UF	3
158849009	CAP VARIABLE .5 - 2.5 PF	8
158849012	CAP VARIABLE 5.0-15 PF	4
169416473	RESISTOR DISC NTC 47 K	1
208122002	IC VOLT REG POS UA7805	2
208123002	IC +12 VOLT REG LM340T-12	3
208124002	IC VOLT REG -5V UA7905UC	1
208124003	IC VOLT REG NEG LM320T-12	3
290120002	DELAY LINE 2 N-SEC	4
290120004	DELAY LINE 4 NS	1
290120005	DELAY LINE 5NS	1
290120009	DELAY LINE 9 N-SEC	2
290199015	DELAY LINE 1.5 NS	2
311210000	CRYSTAL OSCILLATOR 3PPM 10	1
430430002	RELAY 1 FORM C SPDT	9
430441732	RELAY 2 FORM CDPDT	8
430490003	RELAY 2 FORM C DPDT	1

PART: F9354-31 **DESC: DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
430490750	RELAY HF DPDT 75 OHMS	2
454111024	HDR 2MM PRESSFIT TO FEM 4X	14
454115014	HDR FRICTION LOCK 14-PIN	1
454220096	HDR PRESSFIT TO FEM 96	1
454313010	HDR DIP SOLD TO PCB 2X5	3
454315008	HDR DIP SOLD TO PCB 2X4	4
454340002	HDR MALE PIN TO WW 02	5
454390002	HDR FRICTION LOCK 2-PIN	1
505019968	HEAT SINK VERTICAL MTG	3
505070220	HEAT SINK + TAG FOR TO220	6
505132001	HEATSINK (DIAMETER 19MM)	4
505368202	HEATSINK FOR 68 PIN PGA	4
520001020	SELF LOCK FRAME GROUND.SPA	2
530009002	SHIELD (RFI/EMI) FINGER ST	4
530040007	BUZZER 85DB 5V SMALL	1
554416000	NAIL RIVET 1.6X6	2
554425003	SCREW S/TAP PHIL M2.5X6 BL	6
709354331	BASE SHIELD	1
709354351	SHIELD LOWER PARTITION	5
709354361	SHIELD LEFT LOWER PARTITIO	1
709354411	9354-4 OCILLATOR SHIELD	1
7093XXP01	RIGHT ANGLE RECEPT. CONNEC	6
7093XXP21	BULKHEAD RECEPTACLE FEMALE	6
7093XXP41	PROBE HOLDER	6
7093XXP91	PROBE RING CONTACT	6
709450321	HEAT SINK FOR FADC	1
719354313	PC BD PREASS'Y 9354-31	1
CH599043022	HEAT SINK EPOXY	0
F9354-4	400-500MHZ PLL OSCILLATOR	1
FP9354-3	MAIN CARD PANEL 9354-3	1
HSH416	HYB 500MS/S SAMPLE & HOLD	4
MCL404	IC MEM GATE ARRAY MCL404	1
MDX416	IC DEMUX/MINMAX GATE ARRAY	4
MFE409	MONOL. DSO FRONT END (500M	4
MST412	IC SMART TRIGGER GATE-ARRA	1
MTB411	IC TIME BASE GATE-ARRAY	1
MTR408	TRIGGER COUPLING & COMPARA	5
SM158240200	CAP VARIABLE .6 - 2.5 PF	1
SM158240202	CAP VARIABLE 2.5 - 10 PF	4
SM168651297	RES METAL FILM 1% 100 OHMS	10
SM168659004	RES METAL FILM .1% 900 OHM	2
SM168659006	RES METAL FILM .1% 111.1 K	1
SM168659007	RES METAL FILM .1% 3.00K	5
SM168659297	RES METAL FILM .1% 100 OHM	4
SM185457101	RES VARI CERMET 100 OHMS	2

PART: F9354-31 **DESC: DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM185457102	RES VARI CERMET 1 K	4
SM185457103	RES VARI CERMET 10 K	4
SM185457201	RES VARI CERMET 200 OHMS	2
SM185457203	RES VARI CERMET 20 K	9
SM185457501	RES VARI CERMET 500 OHMS	8
SM185457502	RES VARI CERMET 5 K	9
SM185457503	RES VARI CERMET 50 K	4
SM200167102	IC NOR GATE 10H102	2
SM200167131	IC M-S TYP D FLOP 10H131	2
SM200167164	IC 8 TO 1 MPLX 10H164	1
SM200169016	IC BINARY UP COUNTER 10E01	3
SM200169191	IC UP-DOWN BIN COUNTER 74F	5
SM200172008	IC AND GATE 74F08	1
SM200178000	IC 2-INPUT NAND HCT00	1
SM200178002	IC 2-INPUT NOR HCT02	2
SM200178030	IC 8-IN NAND HCT30	1
SM200178074	IC D-TYP FLOP 74HCT74	2
SM200178138	IC 3-8 LINE DECOD HCT 138	4
SM200178273	IC D-TYP FLOP 74HCT273	2
SM200178374	IC D-TYP FLOP 74HCT374	1
SM200278040	IC COUNTER HCT4040	1
SM201164104	IC QUIET 2-IN AND/NAND	1
SM201164131	IC M/S D-TYP FLOP 10E131	3
SM201164167	IC 6-BIT 2:1 MUX REGISTER	1
SM201166195	IC ECL PROG DELAY 2NS 10E1	4
SM201174001	IC ECL 4 IN OR/NOR 10EL01D	2
SM201174005	IC ECL 2-IN DIF AND/NAND	8
SM201174011	IC ECL 1:2 DIF CLOCK DRVR	12
SM201174031	IC ECL FLIP/FLOP SET/RES	2
SM201274032	IC ECL DIV:2 10EL32D	3
SM201274033	IC ECL DIV:4 10EL33D	1
SM201570016	IC ECL DIF RECEIVER 10EL16	2
SM205045300	PROGRAMMED GAL MIMOSA-A	1
SM205045350	PROGRAMMED GAL ROUTE1-A	1
SM205045351	PROGRAMMED GAL ROUTE2-A	1
SM205045352	PROGRAMMED GAL ROUTE2-B	1
SM205045354	PROGRAMMED GAL AVENUE-A	1
SM205045355	PROGRAMMED GAL RUELLE-A	1
SM205045357	PROGRAMMED GAL CHEMIN-A	1
SM205045358	PROGRAMMED GAL ROUTE3-C	1
SM205045359	PROGRAMMED GAL ARTERE-B	1
SM205108002	IC EEPROM 2K BIT IIC BUS	1
SM205618165	IC 8-BIT SHIFT REG 74HCT16	1
SM205618594	IC 8-BIT SHIFT REG 74HC594	24
SM205701070	IC 128KX8 STAT RAM 70 NS	8

PART: F9354-31 **DESC: DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM206070584	IC BUS CONTROLLER PCF8584T	1
SM206260858	IC OCT 8-BIT ADC0858	1
SM206884623	IC OCTAL BUS TRANSCVR ABT6	10
SM206885245	IC BUS TRANSCVR ABT245	2
SM206970457	IC 3 DIF 2:1 MUX MC10E457	3
SM207130025	TRANSISTOR NPN BFT25A	1
SM207170367	IC HEX BUFFER 74HC367	1
SM207171244	IC OCTAL BUFFER ABT244	6
SM207172241	IC OCTAL BUFFER ABT241	3
SM207260718	IC 8-BIT ADC 8718	4
SM207280703	IC 16-BIT DAC 703	1
SM207288800	IC OCTAL 8-BIT CMOS D/A CO	2
SM207360125	IC TRANSLATO MC10125	3
SM207367124	IC TRANSLATOR 10H124	1
SM207367125	IC TRANSLATOR 10H125	2
SM207770201	IC ANALOG SWITCH DG201	8
SM207770403	IC ANALOG SWITCH DG403	1
SM207770442	IC ANALOG SWITCH DG442	2
SM207960157	IC QUAD 2:1 MULTIPLEX 10E1	1
SM207961158	IC 5 BIT 2:1 MUX 10E158	2
SM207970139	IC DECODER/DEMUX 74F139	4
SM207970351	IC OCTAL ANALOG MUX/DEMUX	1
SM207970508	IC ANALOG MULT PLX 8-1 DG5	1
SM207972157	IC DATA SEL/MUX 74F157A	1
SM207978153	IC 4-INPUT MUX HCT153	1
SM207978251	IC 8-IN MUX 3-ST 74HCT251	2
SM208030245	IC TRANS ARRAY NPNX6 SL324	1
SM208470037	IC OP AMP 37GS	1
SM208470347	IC J-FET OP AMP 347	8
SM208470351	IC J-FET OP AMP 351	1
SM208470353	IC DUAL OP AMP 353	2
SM208470705	IC OP AMP PICOAMP INPUT AD	6
SM208570078	IC LOW POWER REG +12V 78L1	1
SM208570805	IC POS VOLT REG 78L05	1
SM208870339	IC VOLT COMPARATOR 339	6
SM208880079	IC LOW POWER REG -12V 79L1	1
SM208971881	IC VIDEO SYNC SEPARATOR LM	1
SM229020150	MLC TR.VOLT SUP.VC08050561	6
SM232022822	DIODE ARRAY SCHTTKY 2822	3
SM232120070	DIODE ARRAY BAV70	3
SM236030099	DIODE SO-PKG BAV99	27
SM236654004	DIODE RECTIFIER 4004	4
SM240050033	DIODE ZENER TZM-C-3V3	5
SM240050051	DIODE ZENER TZM-C-5V1	9
SM240050056	DIODE ZENER TZM-C-5V6	4

PART: F9354-31 **DESC: DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T**

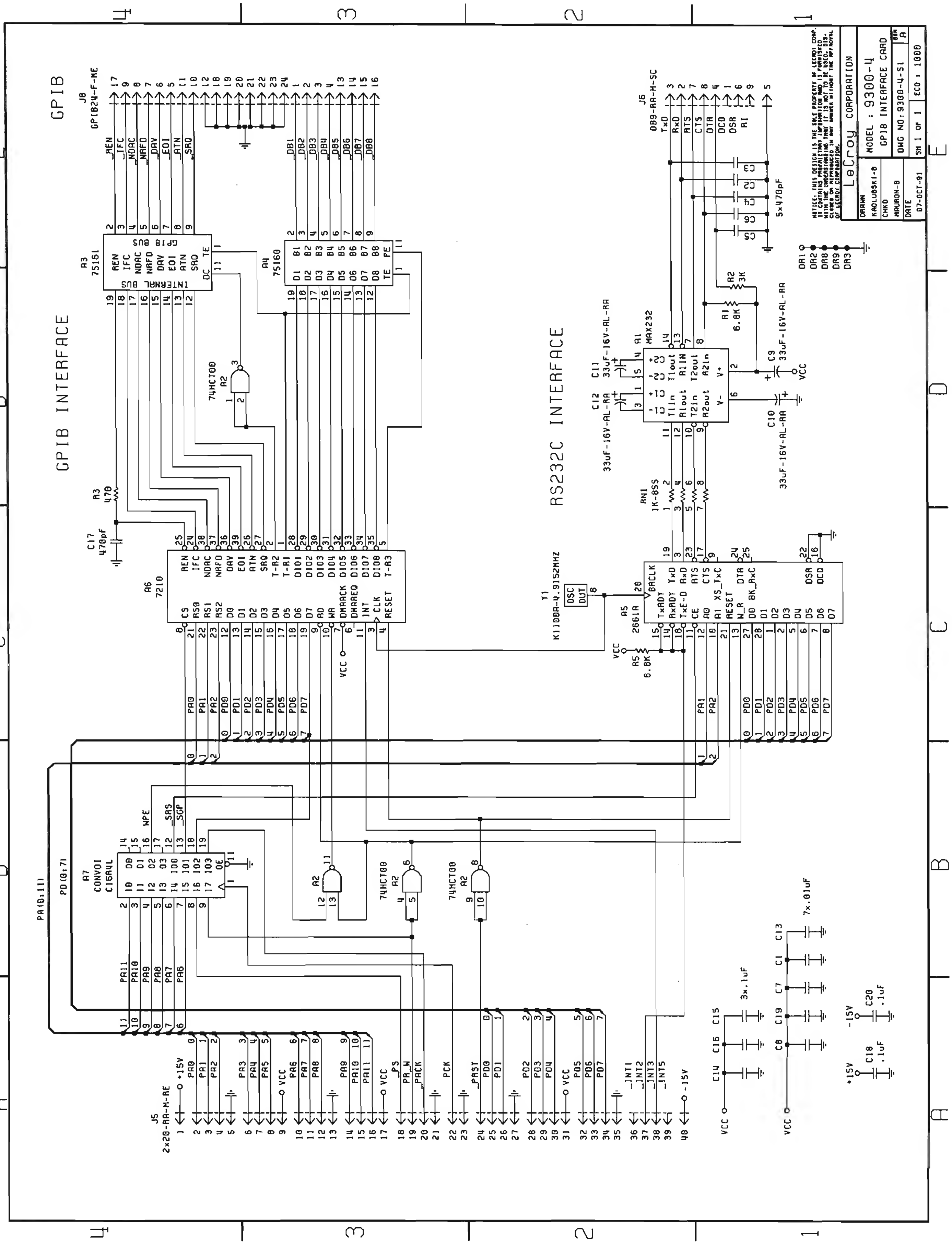
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM240218451	DIODE ZENER BZX84C5V1	20
SM240218475	DIODE ZENER BZX84C7V5	2
SM252023018	DIODE PIN BAT 18	5
SM252080682	DIODE PIN BA682	5
SM253032823	DIODE SCHOTTKY 2823	11
SM270030020	TRANSISTOR NPN BFS20	1
SM270130092	TRANSISTOR NPN BFR92A	40
SM270130093	TRANSISTOR NPN BFR93A	3
SM270140092	TRANSISTOR NPN BFR92AR	1
SM275030092	TRANSISTOR PNP BFT92	8
SM275030093	TRANSISTOR PNP BFT93	4
SM275030550	TRANSISTOR PNP BF550	2
SM275040092	TRANSISTOR PNP BFT92R	4
SM275330858	TRANSISTOR PNP BC858C	22
SM280120416	TRANSISTOR JFET N MMBF4416	5
SM289240061	TRANSISTOR NPN BCV61	4
SM289240062	TRANSISTOR ARRAY BCV62	8
SM289772003	TRANSISTOR ARRAY 2003	4
SM300446150	INDUCTOR .015UH	1
SM300486104	INDUCTOR WOUND 100uH	8
SM301502001	BEAD (FERRITE CHIP)	35
SM310900015	CRYSTAL 15.5029MHZ	1
SM454120025	CONN 1MM FEMALE 25	1
SM651104182	RES CHIP 1% 25PPM 1.8K	1
SM651104183	RES CHIP 1% 25PPM 18 K	1
SM651104201	RES CHIP 1% 25PPM 200 OHM	1
SM651104204	RES CHIP 1% 25PPM 200 K	1
SM651104241	RES CHIP 1% 25PPM 240 OHM	1
SM651104392	RES CHIP 1% 25PPM 3.9K	1
SM652101100	RES CHIP (E24) 1% 10 OHMS	27
SM652101101	RES CHIP (E24) 1% 100 OHM	58
SM652101102	RES CHIP (E24) 1% 1 K	43
SM652101103	RES CHIP (E24) 1% 10 K	92
SM652101104	RES CHIP (E24) 1% 100 K	2
SM652101105	RES CHIP (E24) 1% 1 M	29
SM652101112	RES CHIP (E24) 1% 1.1 K	5
SM652101114	RES CHIP (E24) 1% 110 K	4
SM652101120	RES CHIP (E24) 1% 12 OHMS	4
SM652101121	RES CHIP (E24) 1% 120 OHM	26
SM652101122	RES CHIP (E24) 1% 1.2 K	19
SM652101131	RES CHIP (E24) 1% 130 OHM	17
SM652101151	RES CHIP (E24) 1% 150 OHM	37
SM652101152	RES CHIP (E24) 1% 1.5 K	11
SM652101153	RES CHIP (E24) 1% 15 K	10
SM652101163	RES CHIP (E24) 1% 16 K	9

PART: F9354-31 **DESC: DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM652101181	RES CHIP (E24) 1% 180 OHM	107
SM652101182	RES CHIP (E24) 1% 1.8 K	19
SM652101183	RES CHIP (E24) 1% 18 K	1
SM652101185	RES CHIP (E24) 1% 1.8 M	4
SM652101201	RES CHIP (E24) 1% 200 OHM	74
SM652101202	RES CHIP (E24) 1% 2 K	2
SM652101220	RES CHIP (E24) 1% 22 OHMS	34
SM652101221	RES CHIP (E24) 1% 220 OHM	33
SM652101223	RES CHIP (E24) 1% 22 K	13
SM652101240	RES CHIP (E24) 1% 24 OHMS	13
SM652101241	RES CHIP (E24) 1% 240 OHM	1
SM652101271	RES CHIP (E24) 1% 270 OHM	5
SM652101272	RES CHIP (E24) 1% 2.7 K	5
SM652101301	RES CHIP (E24) 1% 300 OHM	31
SM652101302	RES CHIP (E24) 1% 3 K	13
SM652101330	RES CHIP (E24) 1% 33 OHMS	18
SM652101331	RES CHIP (E24) 1% 330 OHM	7
SM652101332	RES CHIP (E24) 1% 3.3 K	23
SM652101333	RES CHIP (E24) 1% 33 K	4
SM652101334	RES CHIP (E24) 1% 330 K	4
SM652101360	RES CHIP (E24) 1 % 36 OHM	4
SM652101390	RES CHIP (E24) 1% 39 OHMS	4
SM652101391	RES CHIP (E24) 1% 390 OHM	16
SM652101392	RES CHIP (E24) 1% 3.9 K	6
SM652101431	RES CHIP (E24) 1% 430 OHM	36
SM652101470	RES CHIP (E24) 47 OHMS	16
SM652101471	RES CHIP (E24) 1% 470 OHM	34
SM652101472	RES CHIP (E24) 1% 4.7 K	4
SM652101474	RES CHIP (E24) 1% 470 K	1
SM652101475	RES CHIP (E24) 1% 4.7 M	5
SM652101510	RES CHIP (E24) 1% 51 OHMS	33
SM652101511	RES CHIP (E24) 1% 510 OHM	4
SM652101512	RES CHIP (E24) 1% 5.1 K	38
SM652101561	RES CHIP (E24) 1% 560 OHM	8
SM652101562	RES CHIP (E24) 1% 5.6 K	12
SM652101621	RES CHIP (E24) 1% 620 OHM	5
SM652101680	RES CHIP (E24) 1% 68 OHMS	15
SM652101683	RES CHIP (E24) 1% 68 K	5
SM652101684	RES CHIP (E24) 1% 680 K	1
SM652101750	RES CHIP (E24) 1% 75 OHMS	28
SM652101751	RES CHIP (E24) 1% 750 OHM	8
SM652101820	RES CHIP (E24) 1% 82 OHMS	4
SM652101821	RES CHIP (E24) 1% 820 OHM	1
SM652101822	RES CHIP (E24) 1% 8.2 K	13
SM652101823	RES CHIP (E24) 1% 82 K	1

PART: F9354-31 **DESC: DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9354A/T**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM652101824	RES CHIP (E24) 1% 820 K	2
SM652101910	RES CHIP (E24) 1% 91 OHMS	36
SM652101911	RES CHIP (E24) 1% 910 OHM	1
SM652101913	RES CHIP (E24) 1% 91 K	4
SM652110904	RES CHIP 900K 0.5%	7
SM652113523	RES CHIP (24) 0.3% 52.63 K	4
SM652113954	RES CHIP (E24) 0.3% 950 K	4
SM652115062	RES CHIP (E24) 5% 6.2 OHMS	1
SM653206222	RESISTOR NTC 10% 2.2K OHM	8
SM654101000	CHIP JUMPER ZERO OHMS	27
SM661205472	CAP CERA CHIP 5% 4700 PF	4
SM661205822	CAP CERA CHIP 8200PF	5
SM661207102	CAP CERA CHIP 10% .001UF	8
SM661207103	CAP CERA CHIP 20% .01UF (0	457
SM661207104	CAP CERA CHIP 20% .1 UF	169
SM661207223	CAP CERA CHIP 20% .022 UF	4
SM661255010	CAP CERA CHIP 1.0 PF	1
SM661255022	CAP CERA CHIP 2.2 PF	1
SM661255027	CAP CERA CHIP 2.7 PF	1
SM661255033	CAP CERA CHIP 3.3 PF	5
SM661255056	CAP CERA CHIP 5.6 PF	10
SM661255100	CAP CERA CHIP 10PF	2
SM661255101	CAP CERA CHIP 5% 100 PF	10
SM661255102	CAP CERA CHIP 5% 1000 PF	1
SM661255121	CAP CERA CHIP 5% 120 PF	8
SM661255150	CAP CERA CHIP 5% 15 PF	2
SM661255152	CAP CERA CHIP 5% 1500 PF	4
SM661255180	CAP CERA CHIP 5% 18PF	9
SM661255181	CAP CERA CHIP 5% 180 PF	1
SM661255270	CAP CERA CHIP 27PF	5
SM661255330	CAP CERA CHIP 5% 33 PF	5
SM661255560	CAP CERA CHIP 56PF	2
SM661255820	CAP CERA CHIP 5% 82 PF	4
SM661255821	CAP CERA CHIP 5% 820 PF	1
SM661256120	CAP CERA CHIP 10% 12 PF	4
SM661446474	CAP CERA CHIP 10% .47 UF	2
SM661495561	CAP CERA CHIP 5% 560 PF	5
SM661726103	CAP CERA CHIP 10% .01UF (2	15
SM666247106	CAP MOLD TANT CHIP 10 UF	4
SM666257336	CAP MOLD TANT CHIP 33 UF	4
SM666327225	CAP MOLD TANT CHIP 2.2 UF	43
SM666377226	CAP MOLD TANT CHIP 22 UF	4
SM666427105	CAP MOLD TANT CHIP 1 UF	5
SM669080181	CHIP FERRITE BEAD	8


GPIB
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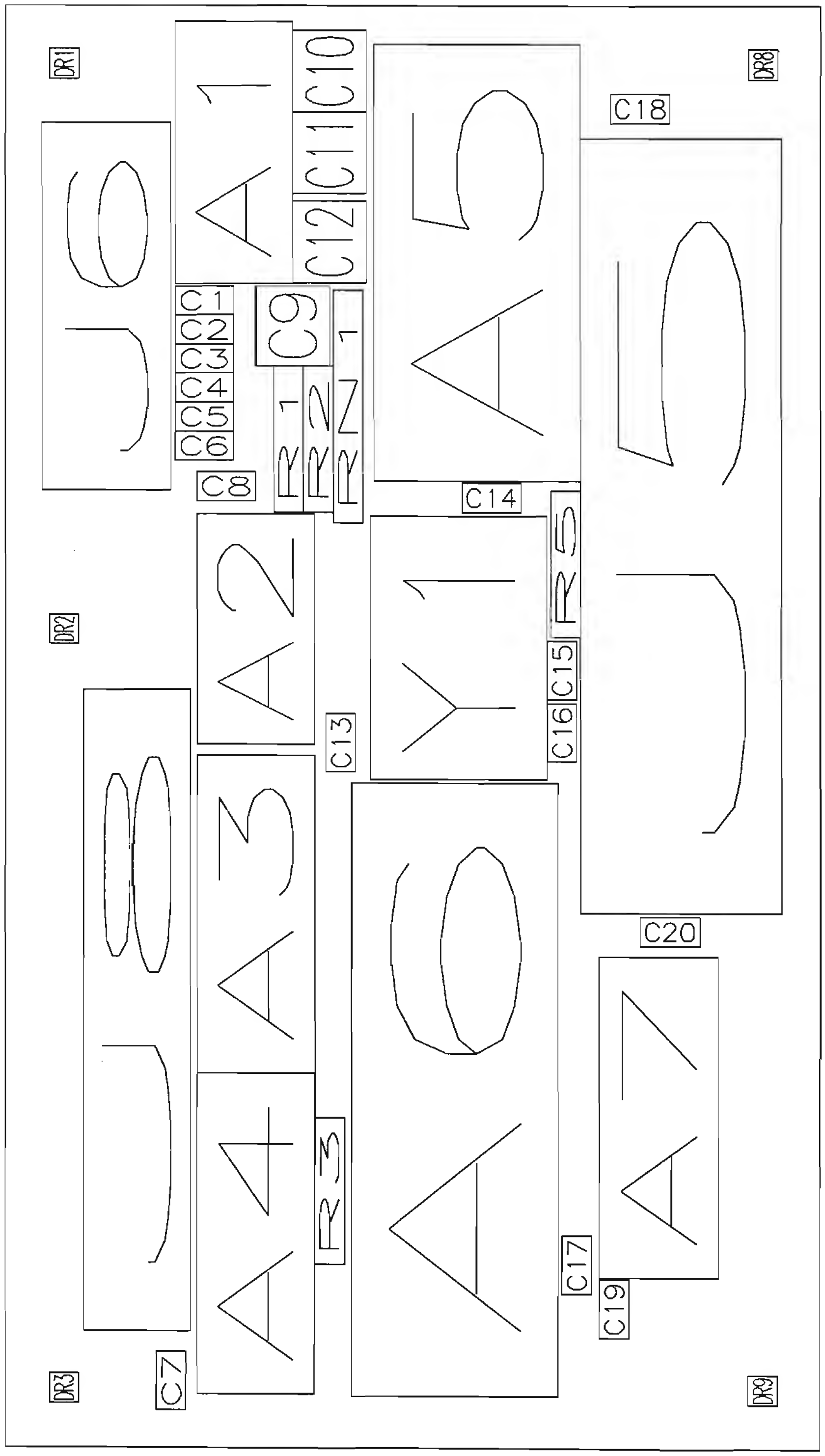
RS232C INTERFACE
LeCroy CORPORATION
MODEL : 9300-4
GPIB INTERFACE CARD
DWG NO: 9300-4-S1
SH 1 OF 1
DRAWN KAOLUBSKI-B
CHKD MAURON-B
DATE 07-OCT-91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C2
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C4
C5
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R2
RN1
A5
J5
C8
C14
R5
A2
DR2
Y1
C15
C16
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C19
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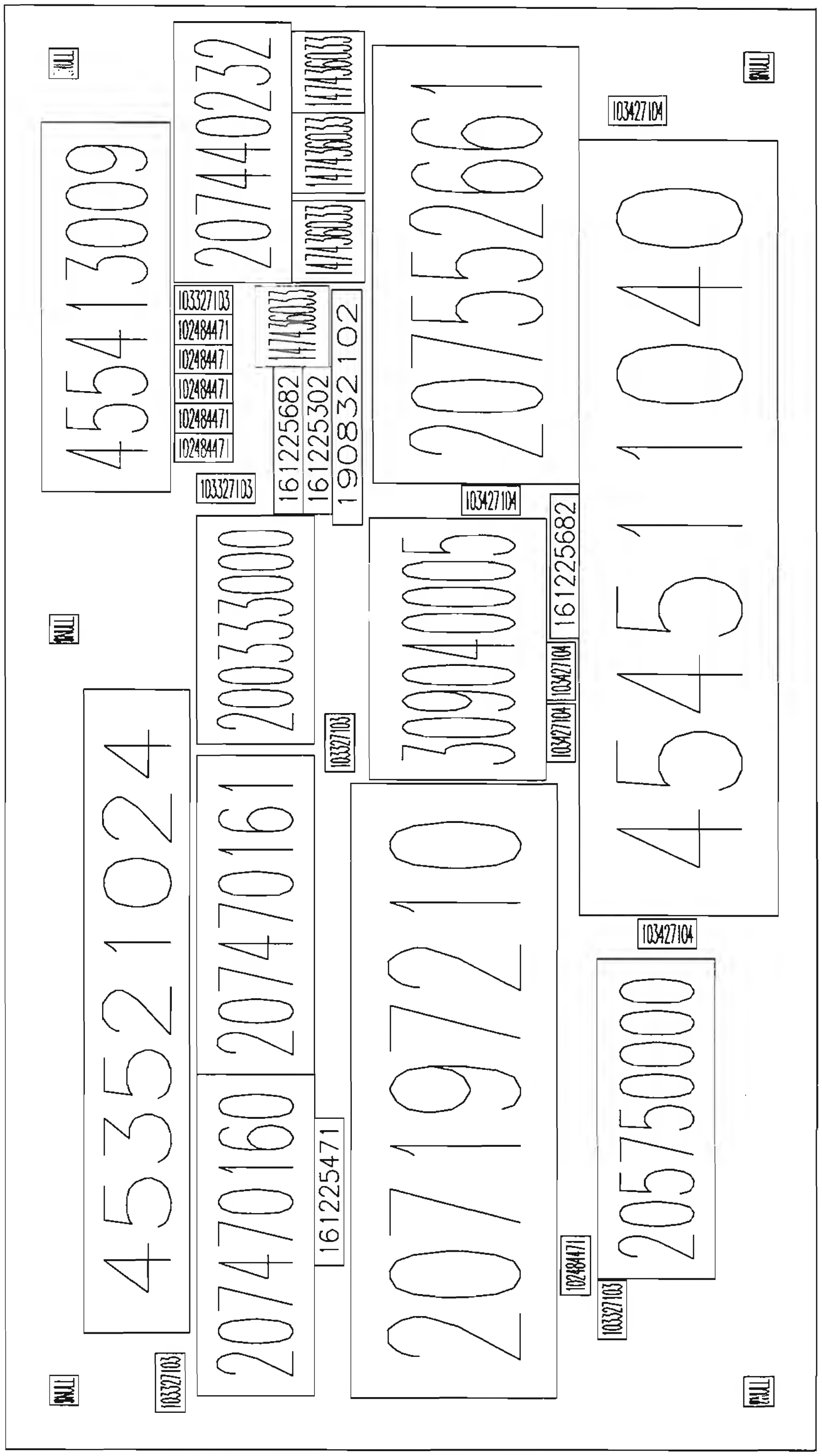
C7
DR9

9300-4 REV:D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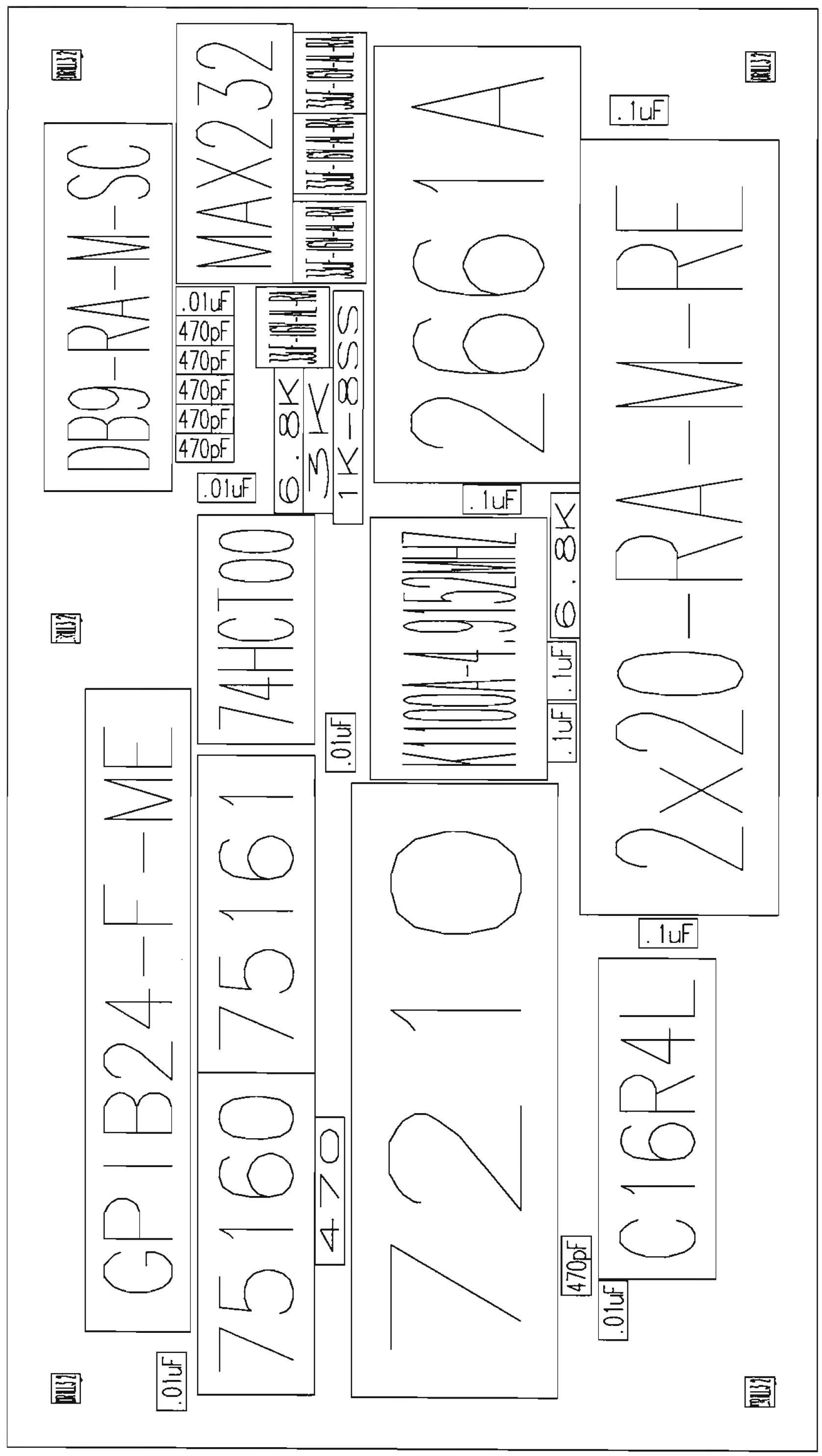
9300-4 REV:D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6.8K
2x20-RA-M-RE
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.1uF
.1uF
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7210
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C16R4L
75160
470
470pF
.01uF
.01uF

9300-4 REV:D

PART: F9300-4 **DESC: GPIB + RS232 INTERFACE CARD**

Location	Part Number	Description
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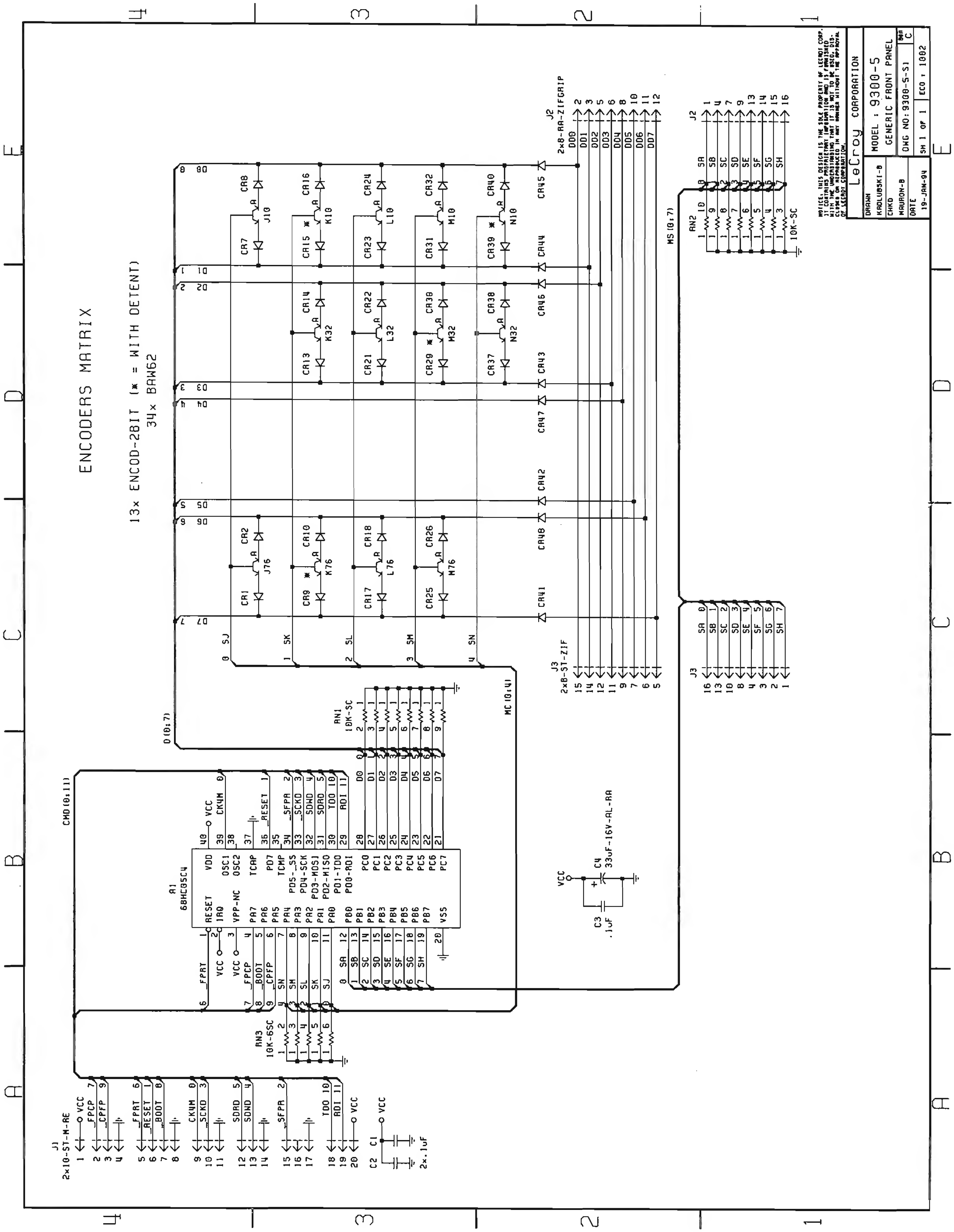
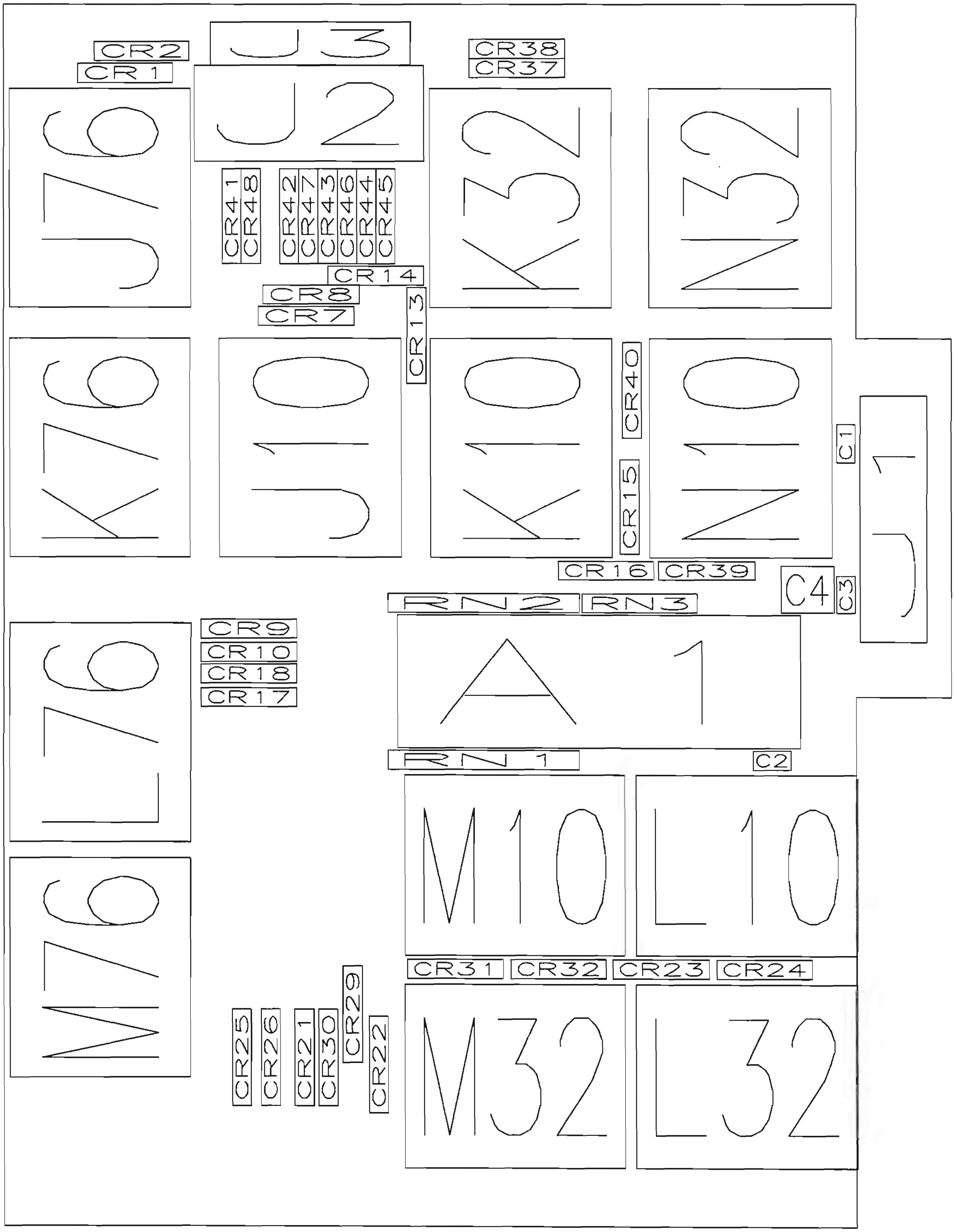
A1	207440232	MAX232
A2	200333000	74HCT00
A3	207470161	75161
A4	207470160	75160
A5	207552661	2661A
A6	207197210	7210
A7	205750000	C16R4L
C1	103327103	.01uF
C2	102484471	470pF
C3	102484471	470pF
C4	102484471	470pF
C5	102484471	470pF
C6	102484471	470pF
C7	103327103	.01uF
C8	103327103	.01uF
C9	147436033	33uF-16V-AL-RA
C10	147436033	33uF-16V-AL-RA
C11	147436033	33uF-16V-AL-RA
C12	147436033	33uF-16V-AL-RA
C13	103327103	.01uF
C14	103427104	.1uF
C15	103427104	.1uF
C16	103427104	.1uF
C17	102484471	470pF
C18	103427104	.1uF
C19	103327103	.01uF
C20	103427104	.1uF
J5	454511040	2x20-RA-M-RE
J6	455413009	DB9-RA-M-SC
J8	453521024	GPIB24-F-ME
R1	161225682	6.8K
R2	161225302	3K
R3	161225471	470
R5	161225682	6.8K
RN1	190832102	1K-8SS
Y1	309040005	K1100A-4.9152MHZ

PART: F9300-4 **DESC: GPIB +RS232 INTERFACE CARD**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
102484471	CAP CERA DISC 100V 470 PF	6
103327103	CAP CERA MONO 50V .01 UF	5
103427104	CAP CERA MONO 100V .1 UF	5
147436033	CAP ALUM METAL CAN 33 UF	4
161225302	RES COMP 1/8W 5% 3 K	1
161225471	RES COMP 1/8W 5% 470 OHMS	1
161225682	RES CARBON FILM 6.8 K	2
190832102	RES NETWORK 1 K	1
200333000	IC QUAD 2-IN NAND HCT00	1
205750000	IC AND-OR GATE ARRAY 16V8	1
207197210	IC BUS INTERF CONTR 7210	1
207440232	IC XMTR/RCVR MAX 232	1
207470160	IC OCTAL BUS XCVR 75160A	1
207470161	IC OCTL BUS XCEIR 75161A	1
207552661	IC INTERFACE 2661A	1
309040005	CRYSTAL OSCIL. 4.9152MHZ	1
453521024	CONN RT ANGLE IEEE FEM 24	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
455413009	CONN RT ANGLE MALE 9 S-CLIP	1
455980002	MOUNTING HDW FOR CONN SHELL	2
550130108	SCREW CYL HD M3X8	2
550430106	SCREW CYL HD PHIL M3X6	1
551430400	WASHER SHAKEPROOF M3	1
709300411	GPIB-RS232 INTERFACE BRACKET D	1
709300421	LABEL RS232-IEEE488-2 A	1
719300403	PC BD PREASS'Y 9300-4 D	1


ENCODERS MATRIX
13x ENCOD-2BIT (* = WITH DETENT)
34x BAW62
A1
68HC05C4
LeCroy CORPORATION
MODEL : 9300-5
GENERIC FRONT PANEL
DWG NO: 9300-5-S1
SH 1 OF 1
ECO : 1002
19-JAN-94



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CR37
J76
K32
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CR48
CR42
CR47
CR43
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J10
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CR16
CR39
C4
C3
RN2
RN3
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CR10
CR18
CR17
A1
L76
RN1
C2
M10
L10
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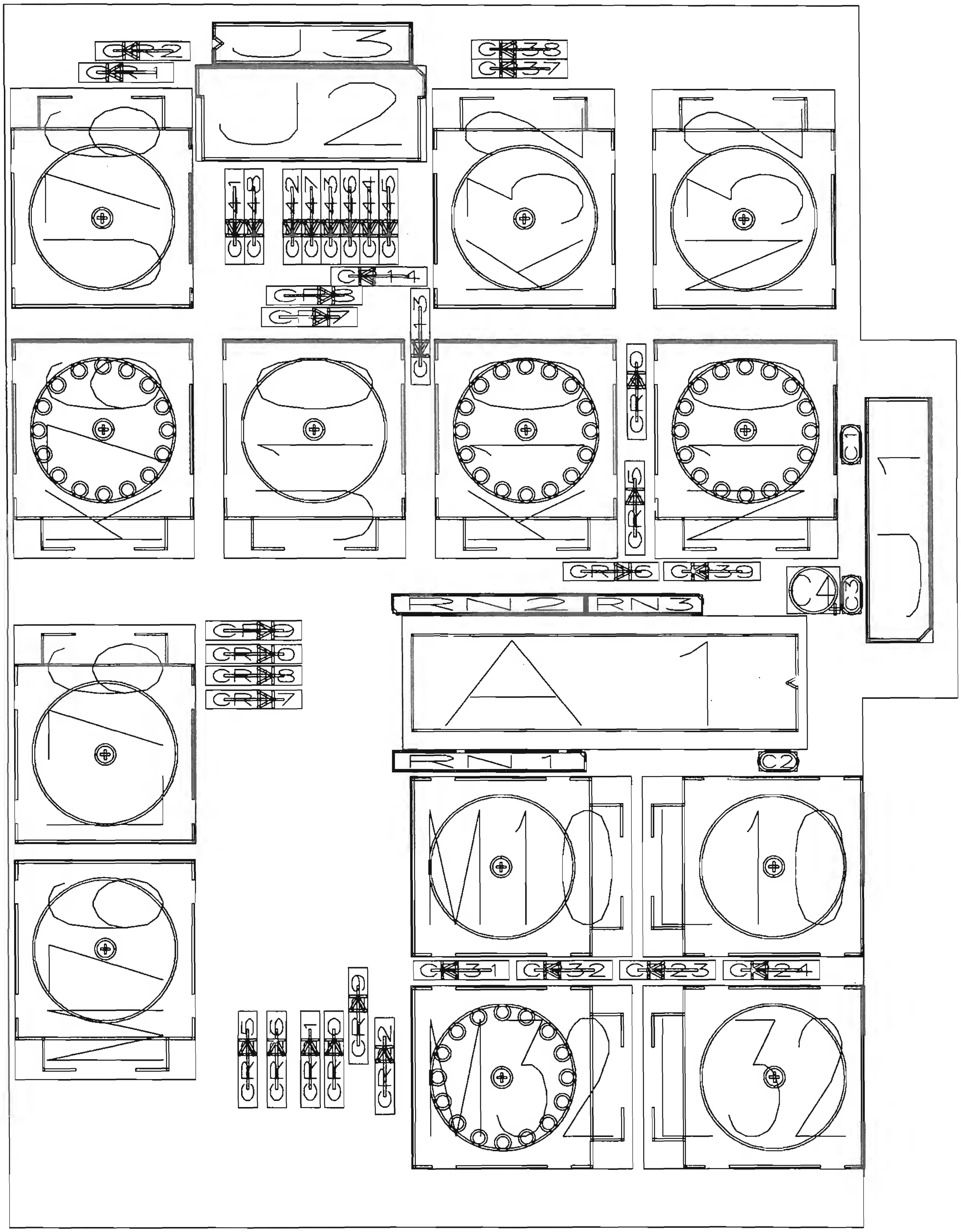
9300-5 Rev:B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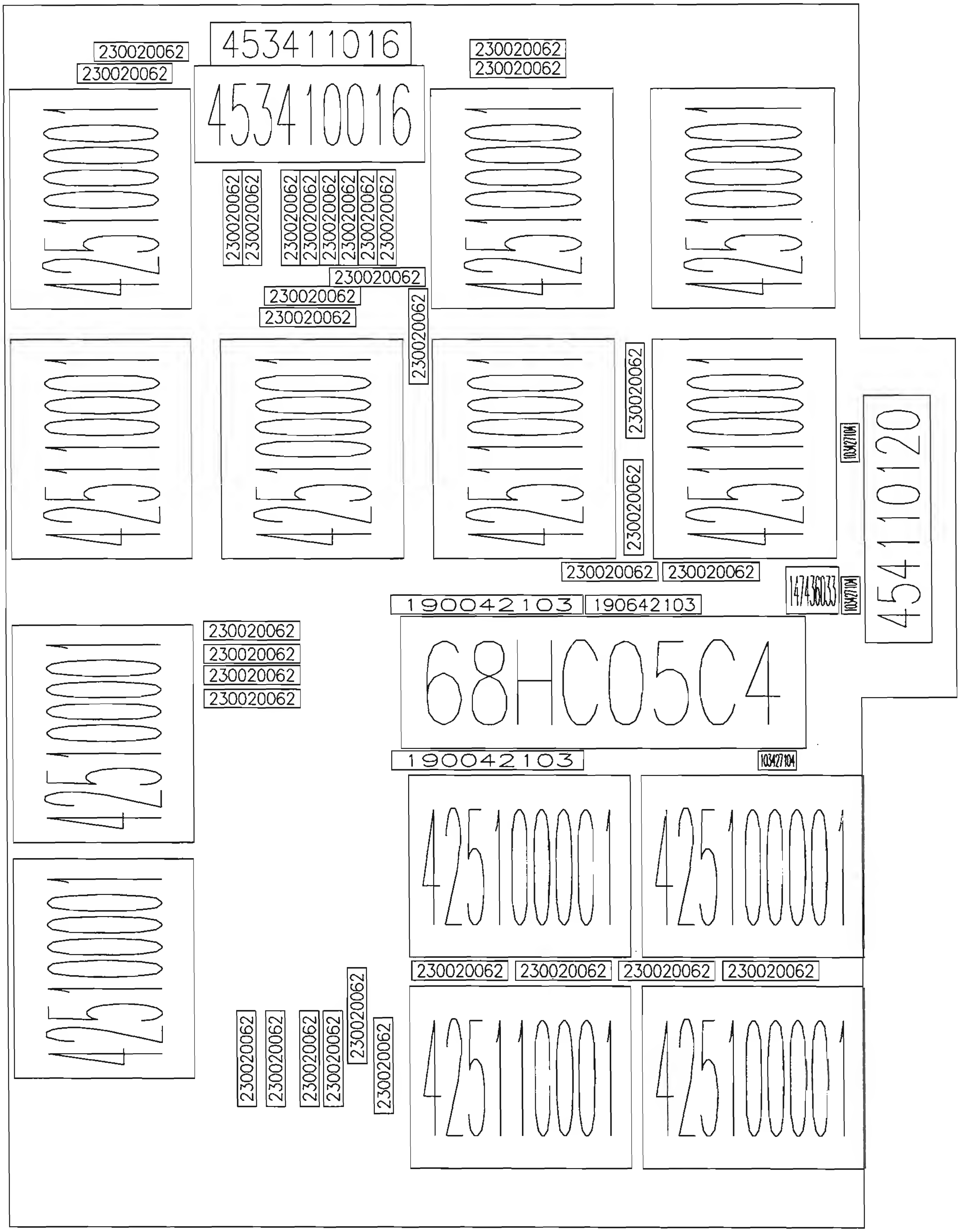
9300-5 Rev:B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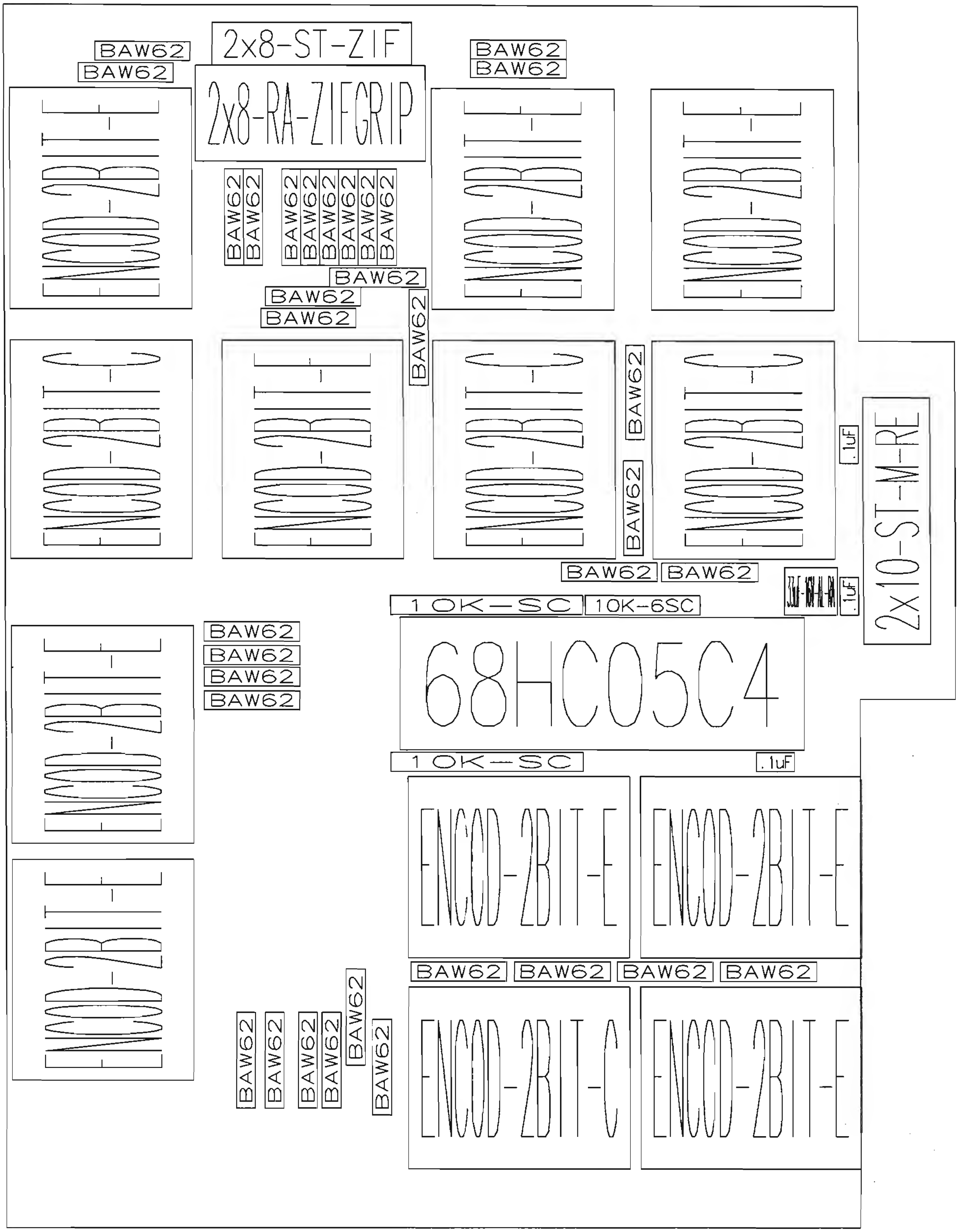
9300-5 Rev:B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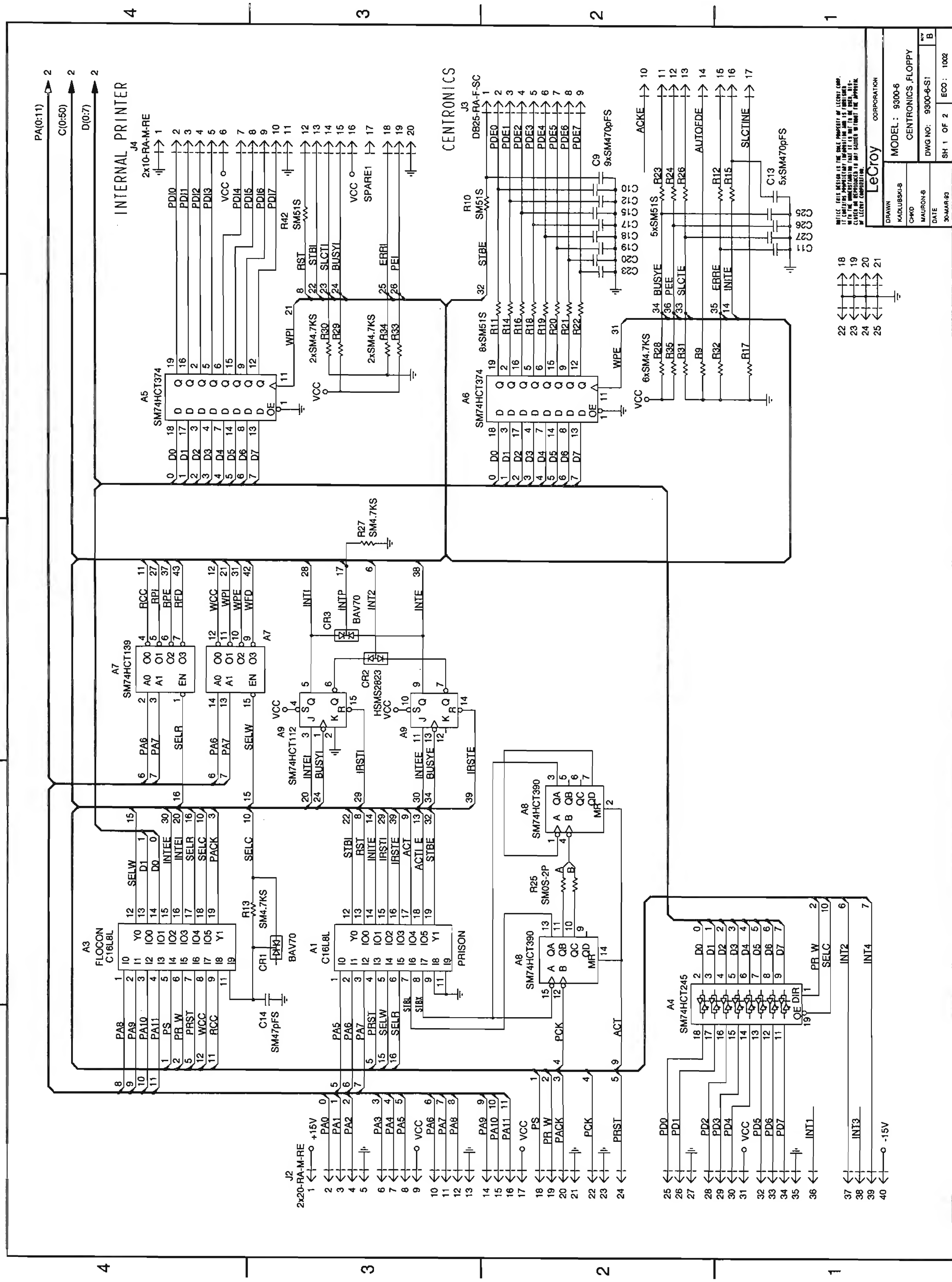
1 0K-SC
10K-6SC
68HC05C4

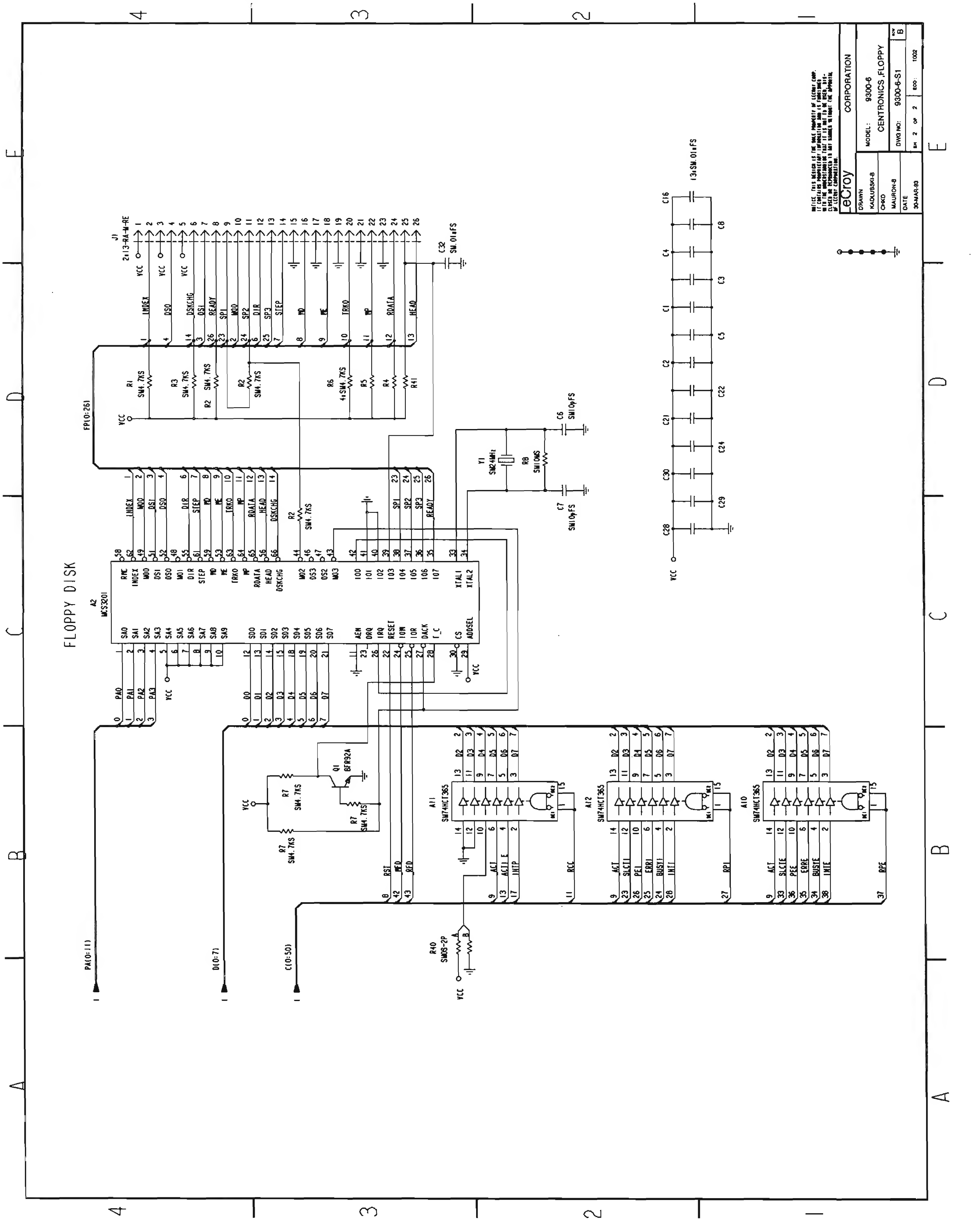
9300-5 Rev:B

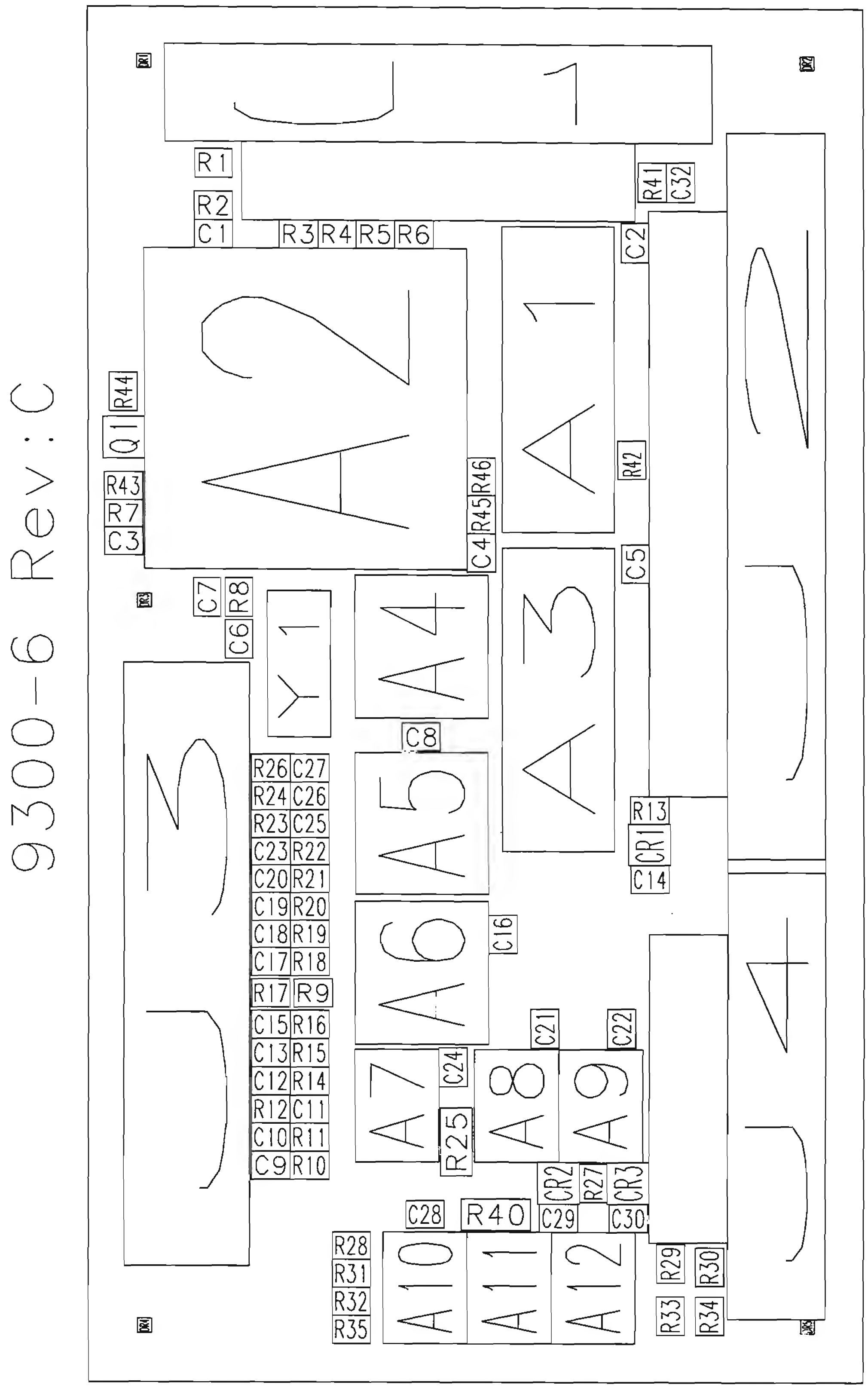
PART: F9354-5 **DESC : Quad Channel Front Panel**

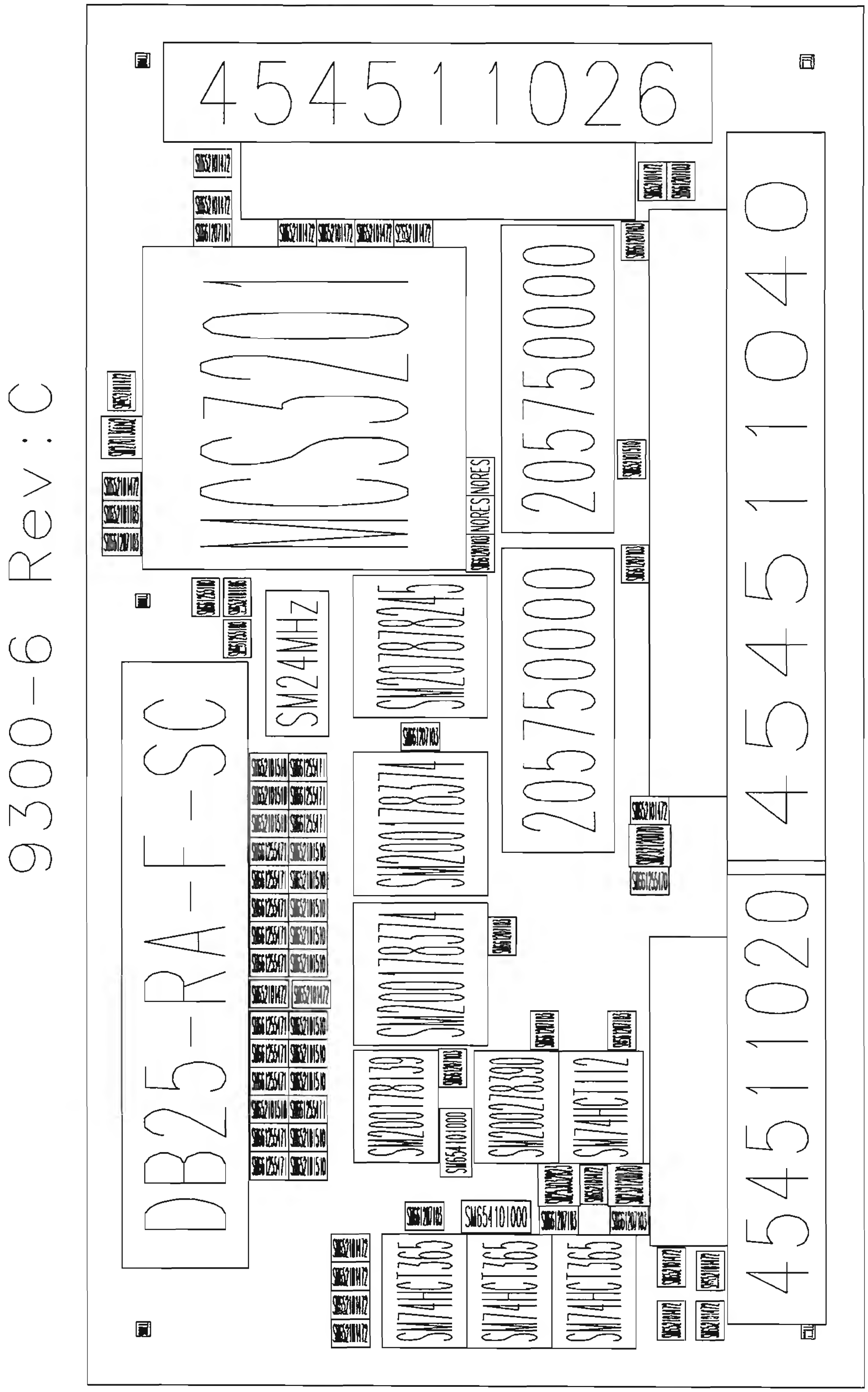
Location	Part Number	Description	Location	Part Number	Description
A1	68HC05C4	68HC05C4	CR15	230020062	BAW62
C1,2,3	103427104	.1uF	CR16	230020062	BAW62
C4	147436033	33uF-16V	CR17	230020062	BAW62
J1	454110120	2x10-ST-M-RE	CR18	230020062	BAW62
J2	453410016	2x8-RA-ZIFGRIP	CR21	230020062	BAW62
J3	453411016	2x8-ST-ZIF	CR22	230020062	BAW62
J10	425100001	ENCOD-2BIT-E	CR23	230020062	BAW62
J76	425100001	ENCOD-2BIT-E	CR24	230020062	BAW62
K10	425110001	ENCOD-2BIT-C	CR25	230020062	BAW62
K32	425100001	ENCOD-2BIT-E	CR26	230020062	BAW62
K76	425110001	ENCOD-2BIT-C	CR29	230020062	BAW62
L10	425100001	ENCOD-2BIT-E	CR30	230020062	BAW62
L32	425100001	ENCOD-2BIT-E	CR31	230020062	BAW62
L76	425100001	ENCOD-2BIT-E	CR32	230020062	BAW62
M10	425100001	ENCOD-2BIT-E	CR37	230020062	BAW62
M32	425110001	ENCOD-2BIT-C	CR38	230020062	BAW62
M76	425100001	ENCOD-2BIT-E	CR39	230020062	BAW62
N10	425110001	ENCOD-2BIT-C	CR40	230020062	BAW62
N32	425100001	ENCOD-2BIT-E	CR41	230020062	BAW62
CR1	230020062	BAW62	CR42	230020062	BAW62
CR2	230020062	BAW62	CR43	230020062	BAW62
CR7	230020062	BAW62	CR44	230020062	BAW62
CR8	230020062	BAW62	CR45	230020062	BAW62
CR9	230020062	BAW62	CR46	230020062	BAW62
CR10	230020062	BAW62	CR47	230020062	BAW62
CR13	230020062	BAW62	CR48	230020062	BAW62
CR14	230020062	BAW62	RN1,2,3	190042103	10K-SC

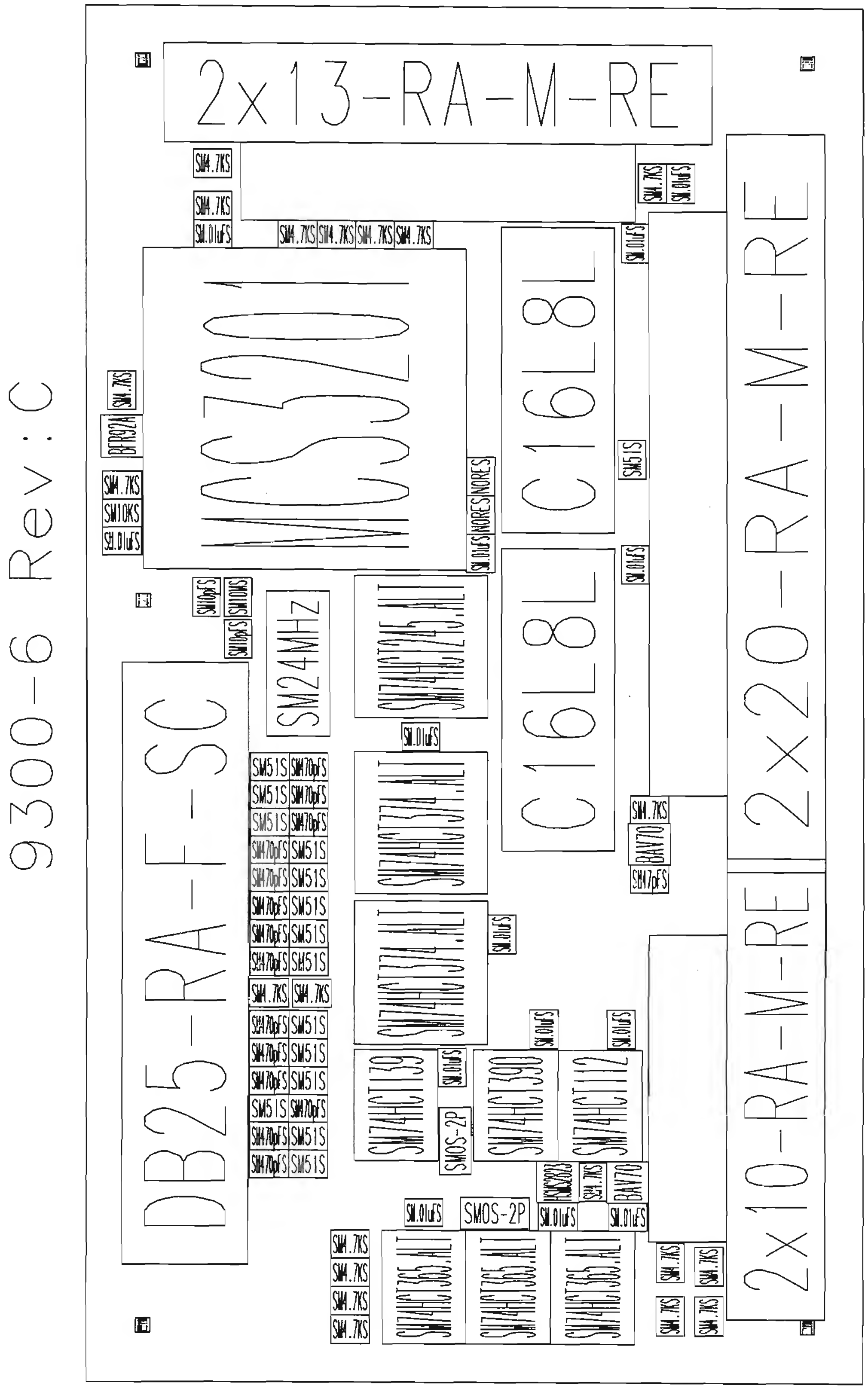
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
103427104	CAP CERA MONO 100V .1 UF	3
147436033	CAP ALUM METAL CAN 33 UF	1
190042103	RESISTOR NETWORK 10 K	2
190642103	RESISTOR NETWORK 10 K	1
230020062	DIODE SWITCHING BAW62	34
425100001	ENCODER DIGITAL 24 POS	8
425110001	ENCODER DIGITAL 24 POS	3
453410016	CONN FLEX CIRCUIT 16-POS	1
454110120	HDR SLD TAIL/MALE/20/STRAIGHT	1
554435004	SCREW PT PHIL KA35X10	1
7093XX511	KNOB 10MM DIAMETRE	7
7093XX521	KNOB 14MM DIAMETRE	4
719300503	PC BD PREASS'Y 9300-5	1
729354513	FP KEYBOARD ASS'Y 9354-5	1
MFP414	IC FRT PANEL PROCESSOR MFP414	1


INTERNAL PRINTER
CENTRONICS
LeCroy CORPORATION
MODEL : 9300-6
CENTRONICS,FLOPPY
DWG NO: 9300-6-S1
SH 1 OF 2
ECO : 1002


FLOPPY DISK
LeCroy CORPORATION
9300-6
CENTRONICS, FLOPPY
9300-6-S1
MCS3201
SM74HCT365
BFR92A


9300-6 Rev:C
J1
J2
J3
J4
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
Y1
Q1
CR1
CR2
CR3
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22 R23 R24 R25 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R40 R41 R42 R43 R44 R45 R46
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C32


454511026
9300-6 Rev:C
MCS3201
2057500000
2057500000
454511040
454511020
DB25-RA-F-SC
SM24MHz
SM74HCT365
SM74HCT365
SM74HCT365
SM74HCT112
SM654101000
SM654101000
NORES
NORES


9300-6 Rev:C
2x13-RA-M-RE
MCS3201
C16L8L
C16L8L
DB25-RA-F-SC
SM24MHz
2x20-RA-M-RE
2x10-RA-M-RE
SMOS-2P
SMOS-2P

PART: F9300-6 **DESC: CENTRONICS, FLOPPY AND PRINTER INTERFACE**

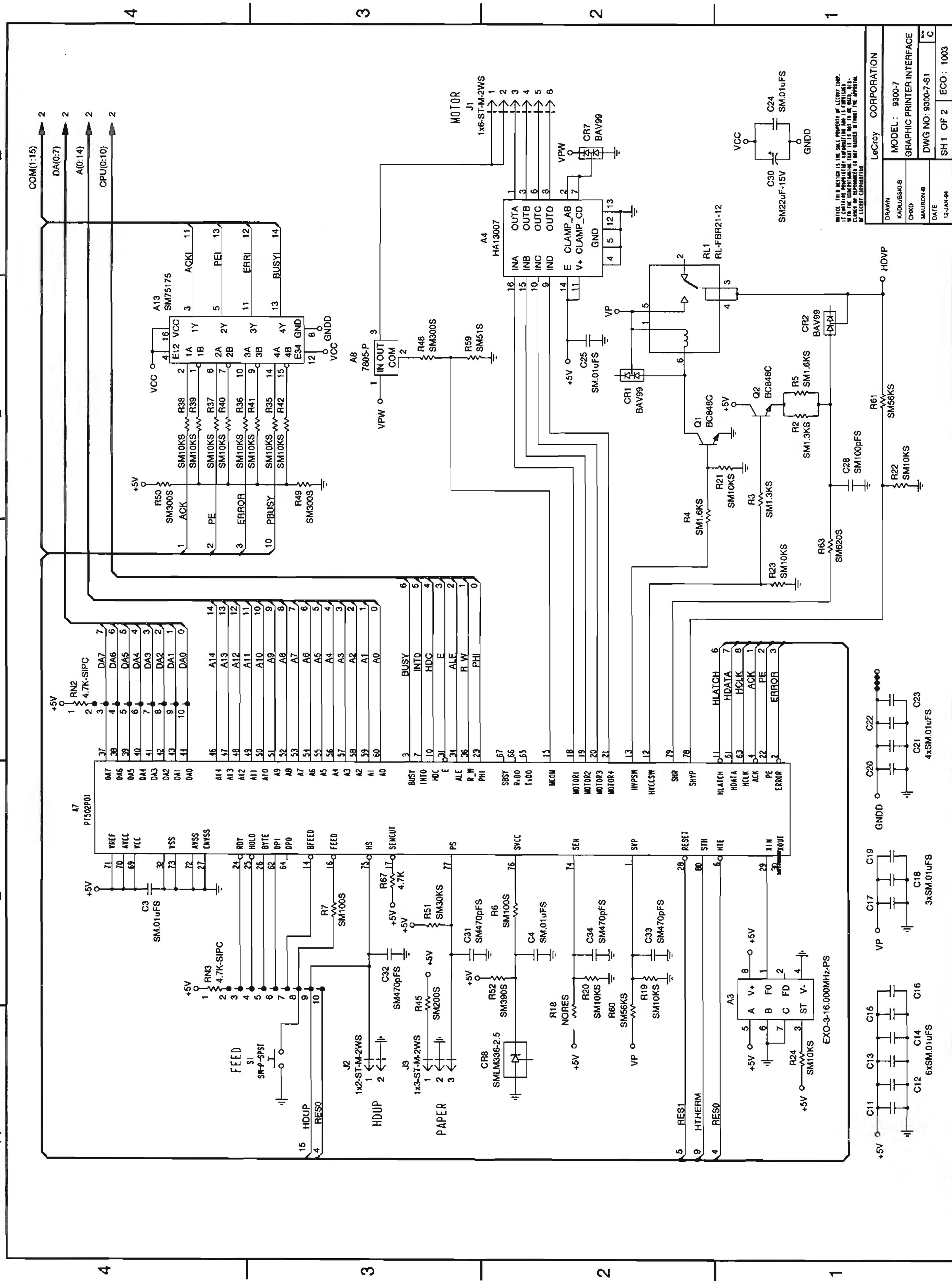
Location	Part Number	Description	Location	Part Number	Description
A1	205750000	C16L8L	CR2	SM253032823	HSMS2823
A2	SM227063201	MCS3201	CR3	SM232120070	BAV70
A3	205750000	C16L8L	J1	454511026	2x13-RA-M-RE
A4	SM207878245	SM74HCT245	J2	454511040	2x20-RA-M-RE
A5	SM200178374	SM74HCT374	J3	454520025	DB25-RA-F-SC
A6	SM200178374	SM74HCT374	J4	454511020	2x10-RA-M-RE
A7	SM200178139	SM74HCT139	Q1	SM270130092	BFR92A
A8	SM200278390	SM74HCT390	R1	SM652101472	SM4.7KS
A9	SM201170112	SM74HCT112	R2	SM652101472	SM4.7KS
A10	SM207170036	SM74HCT365	R3	SM652101472	SM4.7KS
A11	SM207170036	SM74HCT365	R4	SM652101472	SM4.7KS
A12	SM207170036	SM74HCT365	R5	SM652101472	SM4.7KS
C1	SM661207103	SM.01uF	R6	SM652101472	SM4.7KS
C2	SM661207103	SM.01uF	R7	SM652101103	SM10KS
C3	SM661207103	SM.01uF	R8	SM652101106	SM10MS
C4	SM661207103	SM.01uF	R9	SM652101472	SM4.7KS
C5	SM661207103	SM.01uF	R10	SM652101510	SM51S
C6	SM661255100	SM10pF	R11	SM652101510	SM51S
C7	SM661255100	SM10pF	R12	SM652101510	SM51S
C8	SM661207103	SM.01uF	R13	SM652101472	SM4.7KS
C9	SM661255471	SM470pF	R14	SM652101510	SM51S
C10	SM661255471	SM470pF	R15	SM652101510	SM51S
C11	SM661255471	SM470pF	R16	SM652101510	SM51S
C12	SM661255471	SM470pF	R17	SM652101472	SM4.7KS
C13	SM661255471	SM470pF	R18	SM652101510	SM51S
C14	SM661255470	SM47pF	R19	SM652101510	SM51S
C15	SM661255471	SM470pF	R20	SM652101510	SM51S
C16	SM661207103	SM.01uF	R21	SM652101510	SM51S
C17	SM661255471	SM470pF	R22	SM652101510	SM51S
C18	SM661255471	SM470pF	R23	SM652101510	SM51S
C19	SM661255471	SM470pF	R24	SM652101510	SM51S
C20	SM661255471	SM470pF	R25	SM654101000	SM0S-2P
C21	SM661207103	SM.01uF	R26	SM652101510	SM51S
C22	SM661207103	SM.01uF	R27	SM652101472	SM4.7KS
C23	SM661255471	SM470pF	R28	SM652101472	SM4.7KS
C24	SM661207103	SM.01uF	R29	SM652101472	SM4.7KS
C25	SM661255471	SM470pF	R30	SM652101472	SM4.7KS
C26	SM661255471	SM470pF	R31	SM652101472	SM4.7KS
C27	SM661255471	SM470pF	R32	SM652101472	SM4.7KS
C28	SM661207103	SM.01uF	R33	SM652101472	SM4.7KS
C29	SM661207103	SM.01uF	R34	SM652101472	SM4.7KS
C30	SM661207103	SM.01uF	R35	SM652101472	SM4.7KS
C32	SM661207103	SM.01uF	R40	SM654101000	SM0S-2P
CR1	SM232120070	BAV70	R41	SM652101472	SM4.7KS

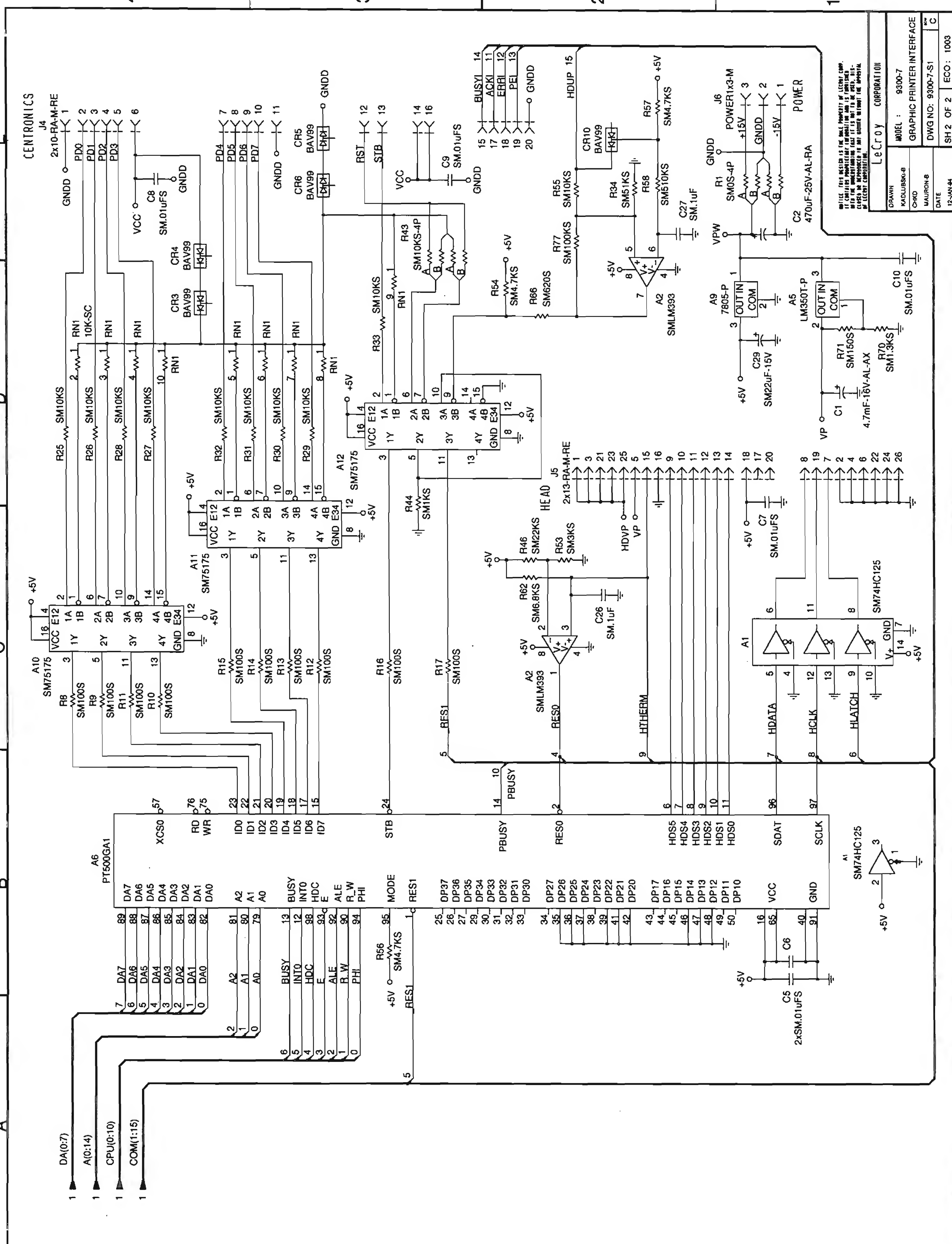
PART: F9300-6 **DESC: CENTRONICS/FLOPPY/PRINTER INTERFACE**

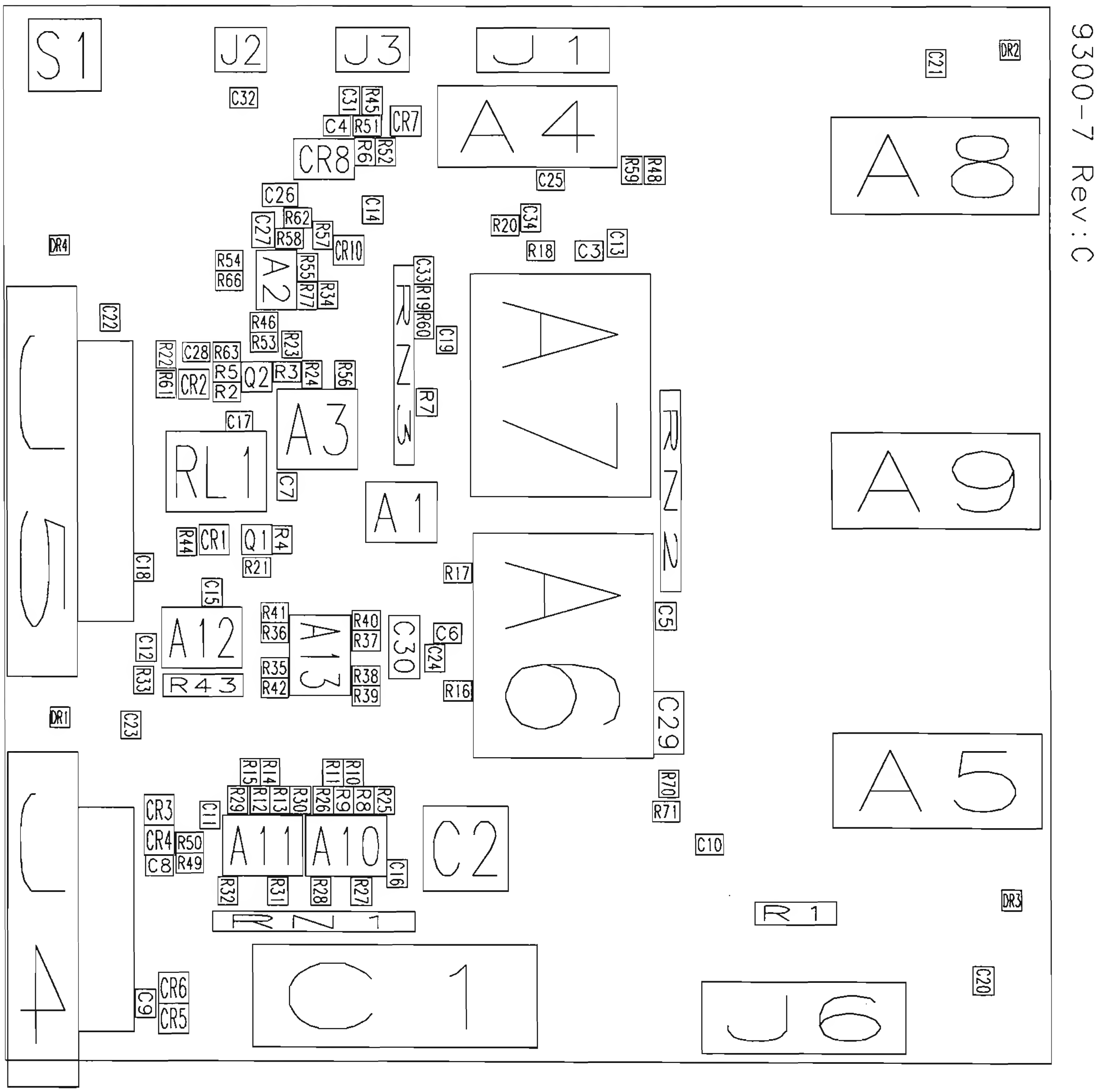
Location	Part Number	Description
R42	SM652101510	SM51S
R43	SM652101472	SM4.7KS
R44	SM652101472	SM4.7KS
Y1	SM310900024	SM24MHz

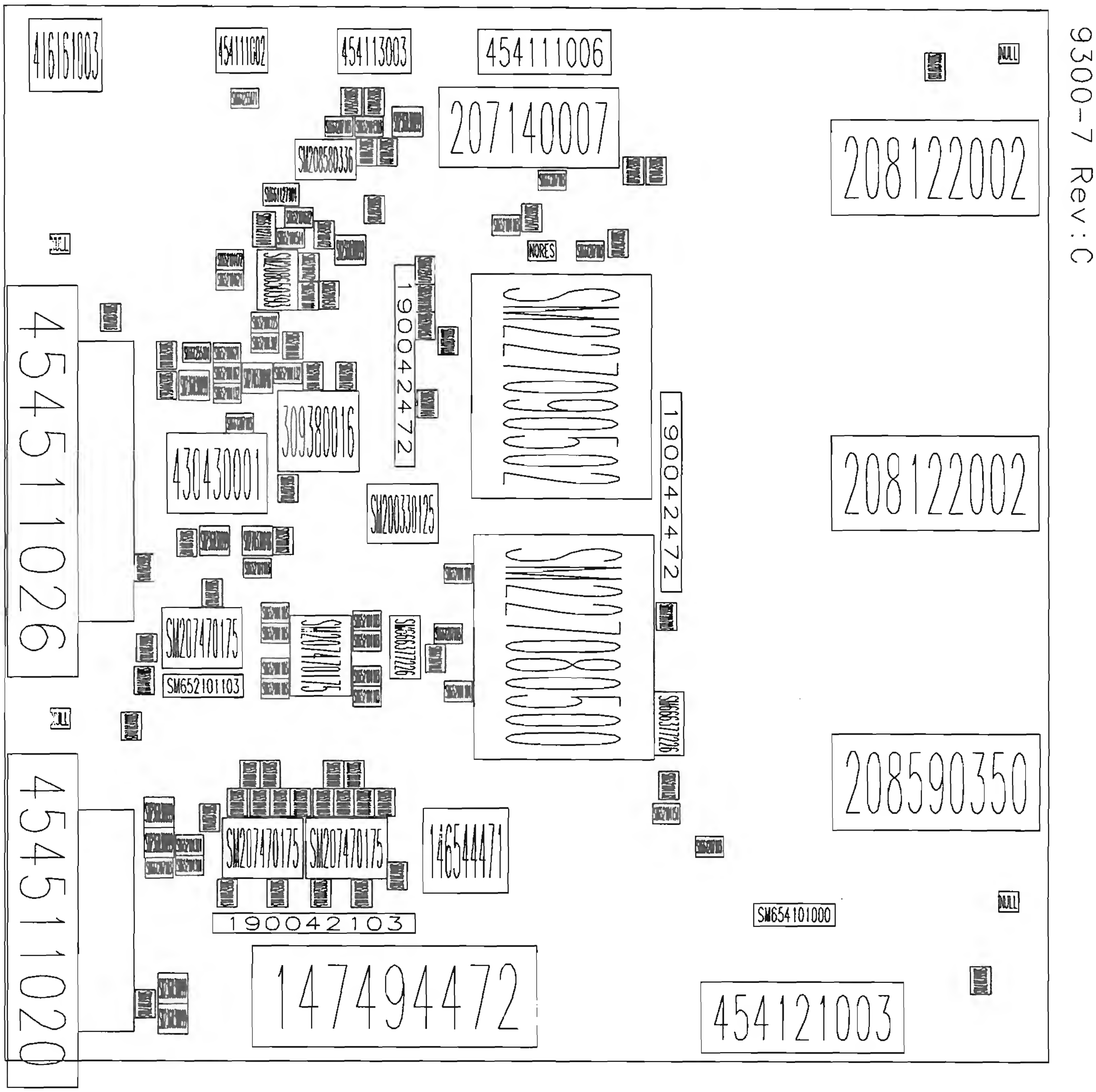
PART: F9300-6 **DESC: CENTRONICS/FLOPPY/PRINTER INTERFACE**

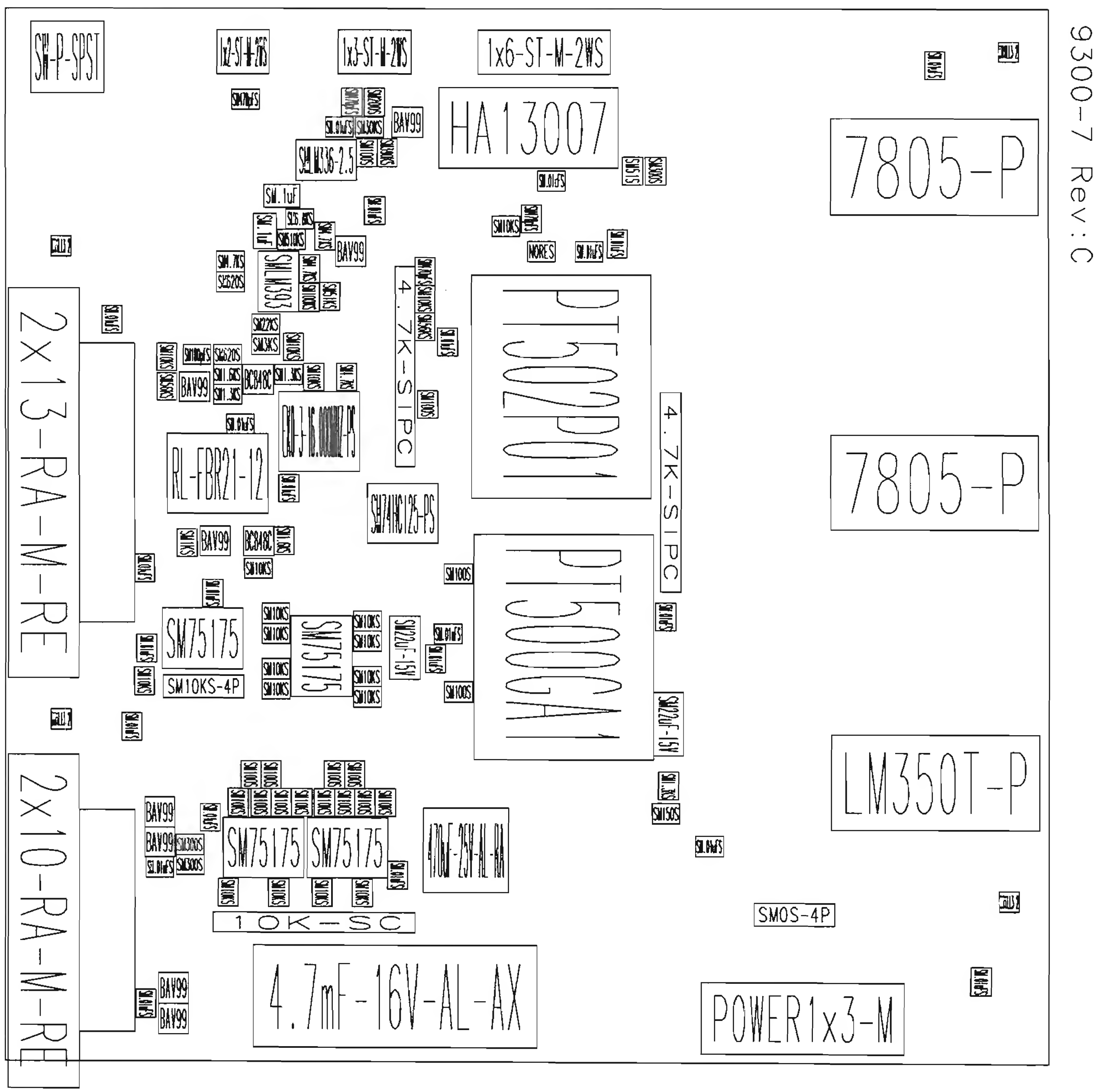
Component	Part Description	Qty Per Assembly
205750000	IC AND-OR GATE ARRAY 16V8	2
454511020	HDR SOLD TAIL/MALE 20	1
454511026	HDR SOLD TAIL/MALE 26	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
454520025	CONN RT ANGLE FEM 25 S-CLIP	1
455980002	MOUNTING HDW FOR CONN SHELL	2
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	4
709300611	CENTR. FLOPPY INTERF. BRACKET B	1
709300621	LABEL PARA-INTERF. CENTRONICS A	1
719300603	PC BD PREASS'Y 9300-6 C	1
SM200178139	IC 2-TO-4-LINE DEC HCT139	1
SM200178374	IC D-TYP FLOP 74HCT374	2
SM200278390	IC 4-BIT RIPPLE COUNTER	1
SM201170112	IC DUAL JK FF WITH SET-RESET	1
SM207170036	IC HEX BUFFER 3-STATE	3
SM207878245	IC BUS TRANSCVR HCT 245	1
SM227063201	IC IBM PC FLOPPY DISK CONTR.	1
SM232120070	DIODE ARRAY BAV70	1
SM253032823	DIODE SCHOTTKY 2823	1
SM270130092	TRANSISTOR NPN BFR92A	1
SM310900024	CRYSTAL 24 MHZ SMD	1
SM652101103	RES CHIP (E24) 1% 10 K	1
SM652101106	RES CHIP (E24) 1% 10 MEG	1
SM652101472	RES CHIP (E24) 1% 4.7 K	21
SM652101510	RES CHIP (E24) 1% 51 OHMS	15
SM654101000	CHIP JUMPER ZERO OHMS	2
SM661207103	CAP CERA CHIP 20% .01UF	14
SM661255100	CAP CERA CHIP 10PF	2
SM661255470	CAP CERA CHIP 47PF	1
SM661255471	CAP CERA CHIP 5% 470 PF	14


LeCroy CORPORATION
MODEL : 9300-7
GRAPHIC PRINTER INTERFACE
DWG NO: 9300-7-S1
SH 1 OF 2
ECO : 1003


LeCroy CORPORATION
MODEL : 9300-7
GRAPHIC PRINTER INTERFACE
DWG NO: 9300-7-S1
SH 2 OF 2
ECO: 1003
DRAWN KADLUBSKI-B
CHKD MAURON-B
DATE 12-JAN-94


9300-7 Rev:C
S1
J2
J3
J1
A4
A8
A7
A9
A3
A2
RL1
A1
A6
A12
A13
A5
A11
A10
C2
C1
J6
J5
J4
R1


416161003
454111002
454113003
454111006
207140007
208122002
SM208580336
190042472
454511026
309380016
430430001
SM208330125
190042472
208122002
SM207470175
SM652101103
208590350
454511020
SM207470175
SM207470175
146544471
190042103
SM654101000
NULL
147494472
454121003
9300-7 Rev:C


9300-7 Rev:C
SW-P-SPST
1x6-ST-M-2WS
HA13007
7805-P
7805-P
2x13-RA-M-RE
2x10-RA-M-RE
PT5022P01
PT5000GA1
4.7K-SIPC
4.7K-SIPC
RL-FBR21-12
SM75175
SM75175
SM75175
SM75175
SM10KS-4P
LM350T-P
SMOS-4P
10K-SC
4.7mF-16V-AL-AX
POWER1x3-M

PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

Location	Part Number	Description	Location	Part Number	Description
A1	SM200330125	SM74HC125	C32	SM661255471	SM470pF
A2	SM208650393	SMLM393	C33	SM661255471	SM470pF
A3	309380016	16.000MHZ	C34	SM661255471	SM470pF
A4	207140007	HA13007	CR1	SM236030099	BAV99
A5	208590350	LM350T-P	CR2	SM236030099	BAV99
A6	SM227080500	PT500GA1	CR3	SM236030099	BAV99
A7	SM227090501	PT501P01	CR4	SM236030099	BAV99
A8	208122002	7805-P	CR5	SM236030099	BAV99
A9	208122002	7805-P	CR6	SM236030099	BAV99
A10	SM207470175	SM75175	CR7	SM236030099	BAV99
A11	SM207470175	SM75175	CR8	SM208580336	SMLM336-2.5
A12	SM207470175	SM75175	CR10	SM236030099	BAV99
A13	SM207470175	SM75175	J1	454111006	1x6-ST-M-2WS
C1	147494472	4.7mF-16V	J2	454111002	1x2-ST-M-2WS
C2	146544471	470uF-25V	J3	454113003	1x3-ST-M-2WS
C3	SM661207103	SM.01uF	J4	454511020	2x10-RA-M-RE
C4	SM661207103	SM.01uF	J5	454511026	2x13-RA-M-RE
C5	SM661207103	SM.01uF	J6	454121003	POWER1x3-M
C6	SM661207103	SM.01uF	Q1	SM270330848	BC848C
C7	SM661207103	SM.01uF	Q2	SM270330848	BC848C
C8	SM661207103	SM.01uF	R1	SM654101000	SM0S-4P
C9	SM661207103	SM.01uF	R2	SM652101132	SM1.3KS
C10	SM661207103	SM.01uF	R3	SM652101132	SM1.3KS
C11	SM661207103	SM.01uF	R4	SM652101162	SM1.6KS
C12	SM661207103	SM.01uF	R5	SM652101162	SM1.6KS
C13	SM661207103	SM.01uF	R6	SM652101101	SM100S
C14	SM661207103	SM.01uF	R7	SM652101101	SM100S
C15	SM661207103	SM.01uF	R8	SM652101101	SM100S
C16	SM661207103	SM.01uF	R9	SM652101101	SM100S
C17	SM661207103	SM.01uF	R10	SM652101101	SM100S
C18	SM661207103	SM.01uF	R11	SM652101101	SM100S
C19	SM661207103	SM.01uF	R12	SM652101101	SM100S
C20	SM661207103	SM.01uF	R13	SM652101101	SM100S
C21	SM661207103	SM.01uF	R14	SM652101101	SM100S
C22	SM661207103	SM.01uF	R15	SM652101101	SM100S
C23	SM661207103	SM.01uF	R16	SM652101101	SM100S
C24	SM661207103	SM.01uF	R17	SM652101101	SM100S
C25	SM661207103	SM.01uF	R19	SM652101103	SM10KS
C26	SM661127104	SM.1uF	R20	SM652101103	SM10KS
C27	SM661127104	SM.1uF	R21	SM652101103	SM10KS
C28	SM661255101	SM100pF	R22	SM652101103	SM10KS
C29	SM666377226	SM22uF-15V	R23	SM652101103	SM10KS
C30	SM666377226	SM22uF-15V	R24	SM652101103	SM10KS
C31	SM661255471	SM470pF	R25	SM652101103	SM10KS

PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

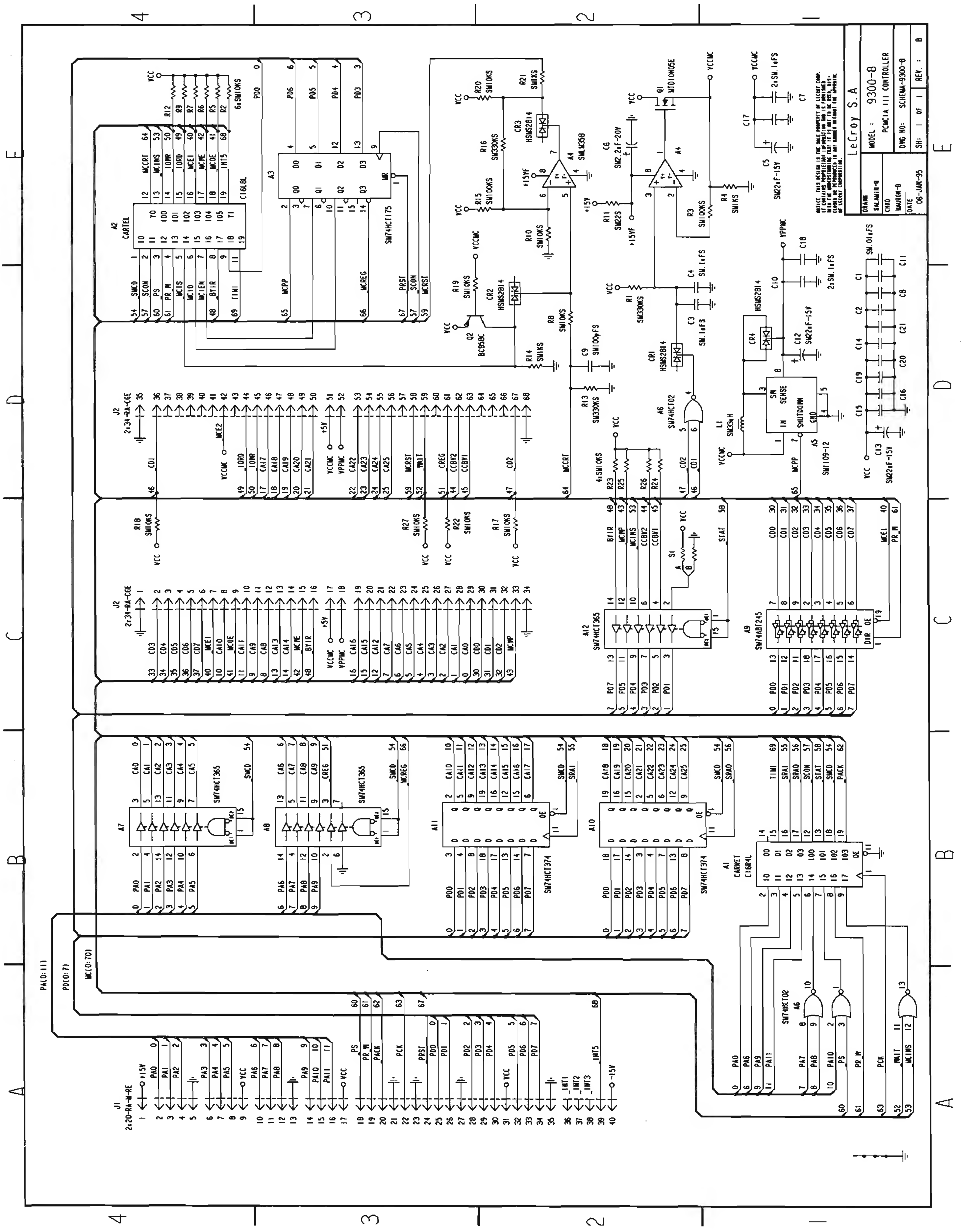
Location	Part Number	Description	Location	Part Number	Description
R26	SM652101103	SM10KS	R50	SM652101301	SM300S
R27	SM652101103	SM10KS	R51	SM652101303	SM30KS
R28	SM652101103	SM10KS	R52	SM652101391	SM390S
R29	SM652101103	SM10KS	R53	SM652101302	SM3KS
R30	SM652101103	SM10KS	R54	SM652101472	SM4.7KS
R31	SM652101103	SM10KS	R55	SM652101103	SM10KS
R32	SM652101103	SM10KS	R56	SM652101472	SM4.7KS
R33	SM652101103	SM10KS	R57	SM652101472	SM4.7KS
R34	SM652101513	SM51KS	R58	SM652101514	SM510KS
R35	SM652101103	SM10KS	R59	SM652101510	SM51S
R36	SM652101103	SM10KS	R60	SM652101563	SM56KS
R37	SM652101103	SM10KS	R61	SM652101563	SM56KS
R38	SM652101103	SM10KS	R62	SM652101682	SM6.8KS
R39	SM652101103	SM10KS	R63	SM652101621	SM620S
R40	SM652101103	SM10KS	R66	SM652101621	SM620S
R41	SM652101103	SM10KS	R70	SM652101132	SM1.3KS
R42	SM652101103	SM10KS	R71	SM652101151	SM150S
R43	SM652101103	SM10KS-4P	R77	SM652101104	SM100KS
R44	SM652101102	SM1KS	RL1	430430001	RL-FBR21-12
R45	SM652101201	SM200S	RN1	190042103	10K-SC
R46	SM652101223	SM22KS	RN2	190042472	4.7K-SIPC
R48	SM652101301	SM300S	RN3	190042472	4.7K-SIPC
R49	SM652101301	SM300S	S1	416161003	SW-P-SPST

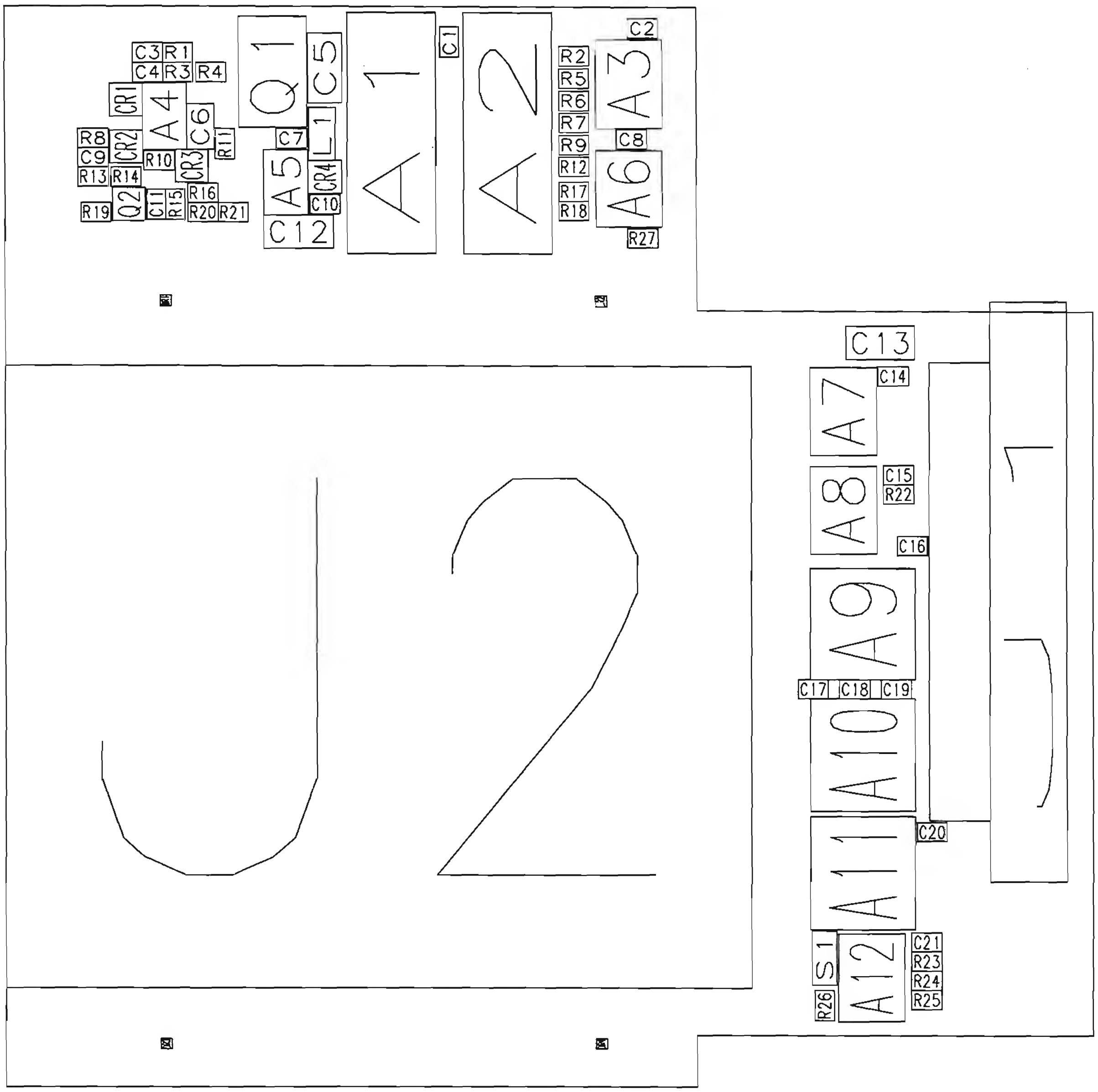
PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

Component	Part Description	Qty Per Assembly
146544471	CAP MINI ALUM 20% 470UF	1
147494472	CAP ALU COMPACT AXIAL 4700 UF	1
190042103	RESISTOR NETWORK 10 K	1
190042472	RESISTOR NETWORK 4.7 K	2
207140007	IC QUAD STEP MOTOR DRIVER	1
208122002	IC VOLT REG POS UA7805	2
208590350	IC ADJ POWER REG 3A LM350	1
309380016	CRYSTAL OSC (PROGR) 16 MHZ	1
416161003	SWITCH PUSHBUTTON SPST	1
430430002	RELAY 1 FORM C SPDT	1
454111002	HEADER STRAIGHT 2-PINS	1
454111006	HEADER STRAIGHT 6-PINS	1
454113003	HEADER STRAIGHT 3-PINS	1
454121003	BLOC FOR SOCKETS 3-PIN	1
454511020	HDR SOLD TAIL/MALE 20	1

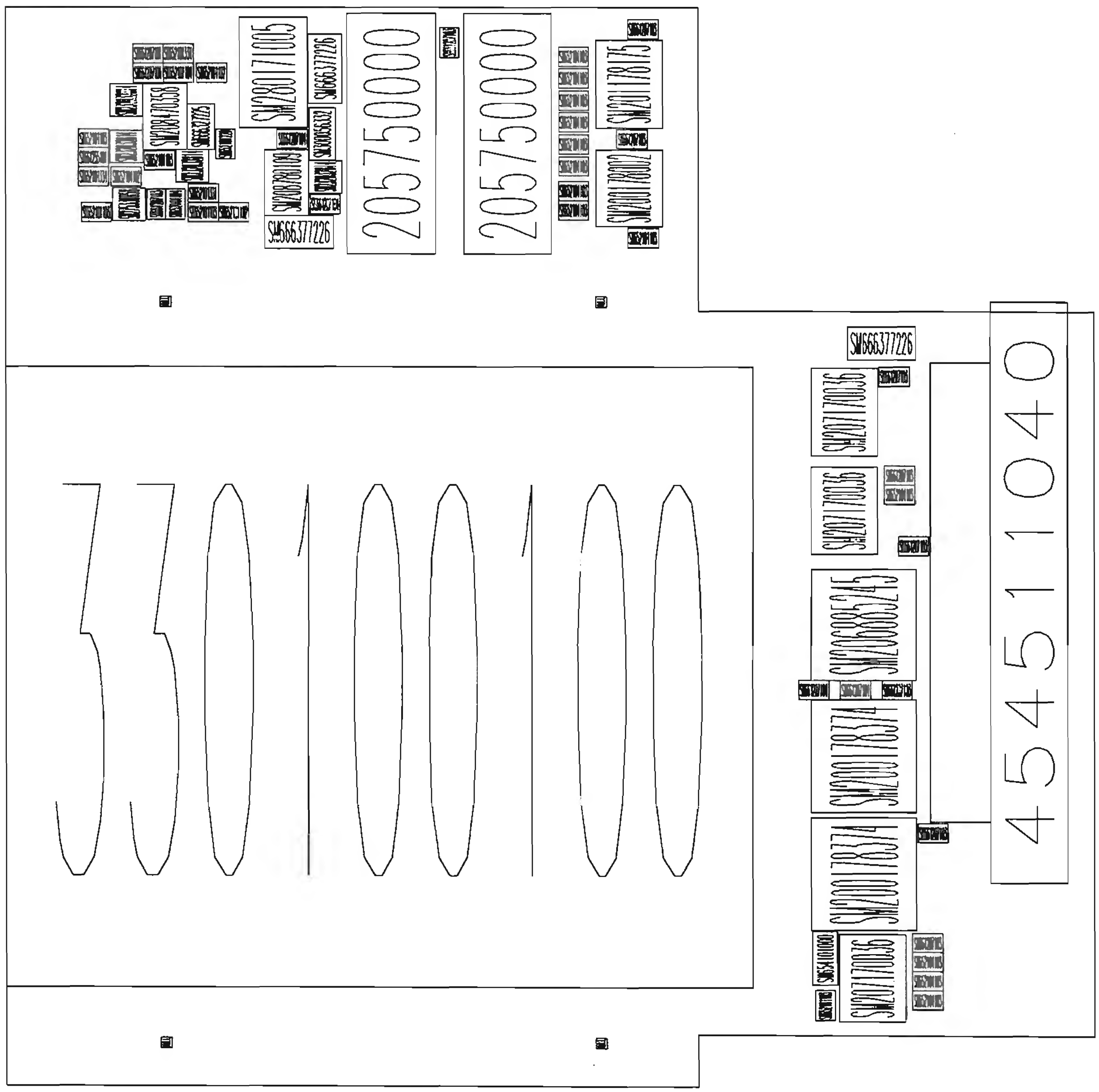
PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

Component	Part Description	Qty Per Assembly
454511026	HDR SOLD TAIL/MALE 26	1
554435401	RIVET "RIVSCREW" M 3.5	3
719300703	PC BD PREASS'Y 9300-7	1
SM200330125	IC QUAD BUFFER 74HC125	1
SM207470175	IC QUAD DIFF LINE RECEIVER	4
SM208580336	IC REF DIODE LM336-2.5V	1
SM208650393	IC DUAL VOLT COMP LM393M	1
SM227080500	IC THERM PRINTER GATE ARRAY	1
SM227090501	IC THERM PRINTER CPU	1
SM236030099	DIODE SO-PKG BAV99	8
SM270330848	TRANSISTOR NPN BC848C	2
SM652101101	RES CHIP (E24) 1% 100 OHM	12
SM652101102	RES CHIP (E24) 1% 1 K	1
SM652101103	RES CHIP (E24) 1% 10 K	25
SM652101104	RES CHIP (E24) 1% 100 K	1
SM652101132	RES CHIP (E24) 1% 1.3 K	3
SM652101151	RES CHIP (E24) 1% 150 OHM	1
SM652101162	RES CHIP (E24) 1% 1.6 K	2
SM652101201	RES CHIP (E24) 1% 200 OHM	1
SM652101223	RES CHIP (E24) 1% 22 K	1
SM652101301	RES CHIP (E24) 1% 300 OHM	3
SM652101302	RES CHIP (E24) 1% 3 K	1
SM652101303	RES CHIP (E24) 1% 30 K	1
SM652101391	RES CHIP (E24) 1% 390 OHM	1
SM652101472	RES CHIP (E24) 1% 4.7 K	3
SM652101510	RES CHIP (E24) 1% 51 OHMS	1
SM652101513	RES CHIP (E24) 1% 51 K	1
SM652101514	RES CHIP (E24) 1% 510 K	1
SM652101563	RES CHIP (E24) 1% 56 K	2
SM652101621	RES CHIP (E24) 1% 620 OHM	2
SM652101682	RES CHIP (E24) 1% 6.8 K	1
SM654101000	CHIP JUMPER ZERO OHMS	1
SM661127104	CAP CERA CHIP 20% .1 UF	2
SM661207103	CAP CERA CHIP 20% .01UF	23
SM661255101	CAP CERA CHIP 5% 100 PF	1
SM661255471	CAP CERA CHIP 5% 470 PF	4
SM666377226	CAP MOLD TANT CHIP 22 UF	2

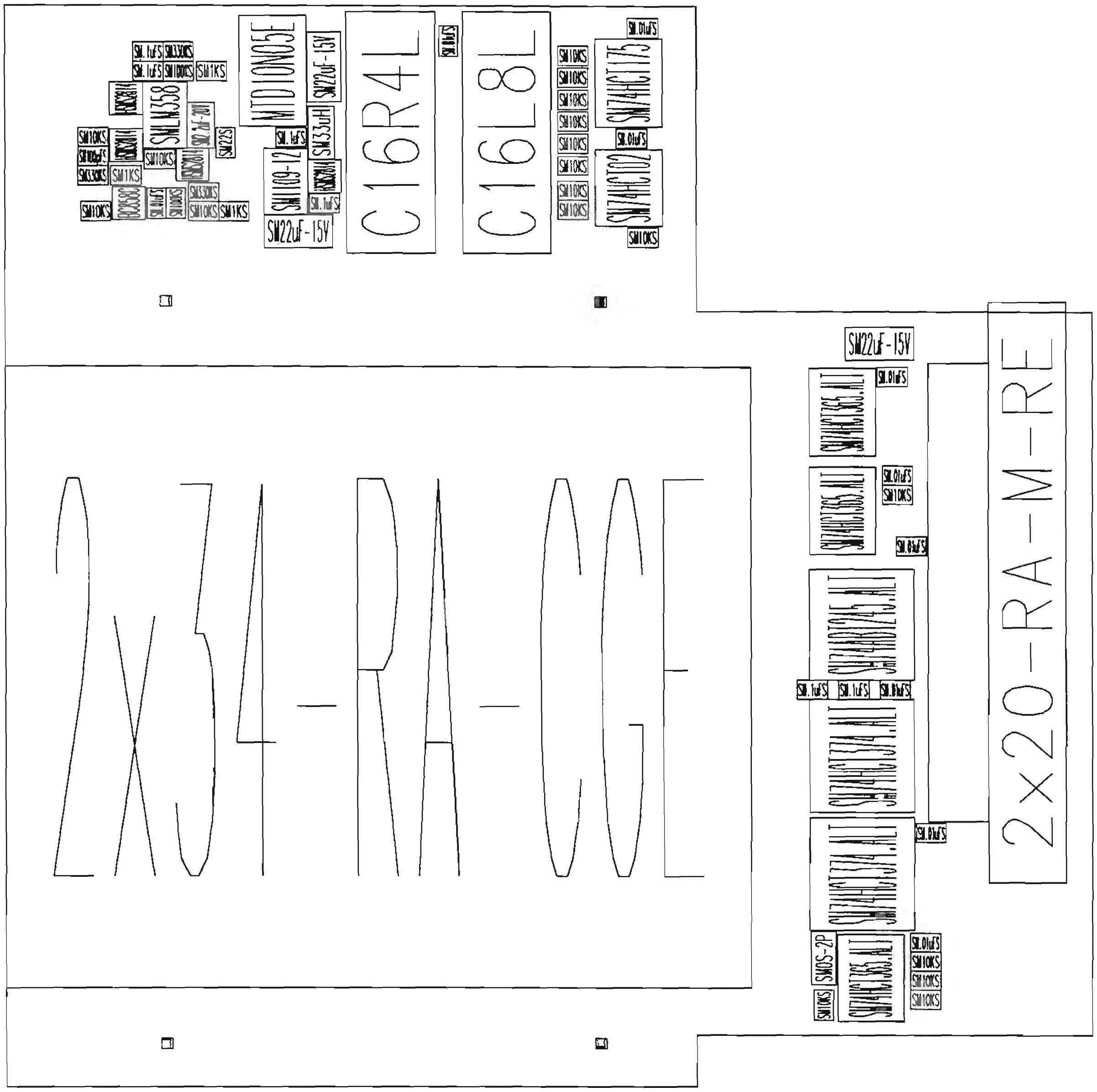

LeCroy S.A
MODEL : 9300-B
PCMCIA III CONTROLLER
DWG NO: SCHEMA-9300-B
SH: 1 OF 1
REV. : B
DATE 06-JAN-95


C3 R1
C4 R3 R4
CR1 A4 C6
R8 CR2 R11
C9 R10 CR3
R13 R14
R19 Q2 C11 R15 R16 R20 R21
Q1 C5
C7 L1
A5 CR4 C10
C12
A1
C1
A2
R2 R5 R6 R7 R9 R12 R17 R18
C2 A3 C8 A6 R27
C13
C14 A7
A8 C15 R22
C16
A9
C17 C18 C19
A10
C20
A11
S1 A12 C21 R23 R24 R25
R26
J2
J1

9300-8 Rev:B



9300-8 Rev:B



9300-8 Rev:B

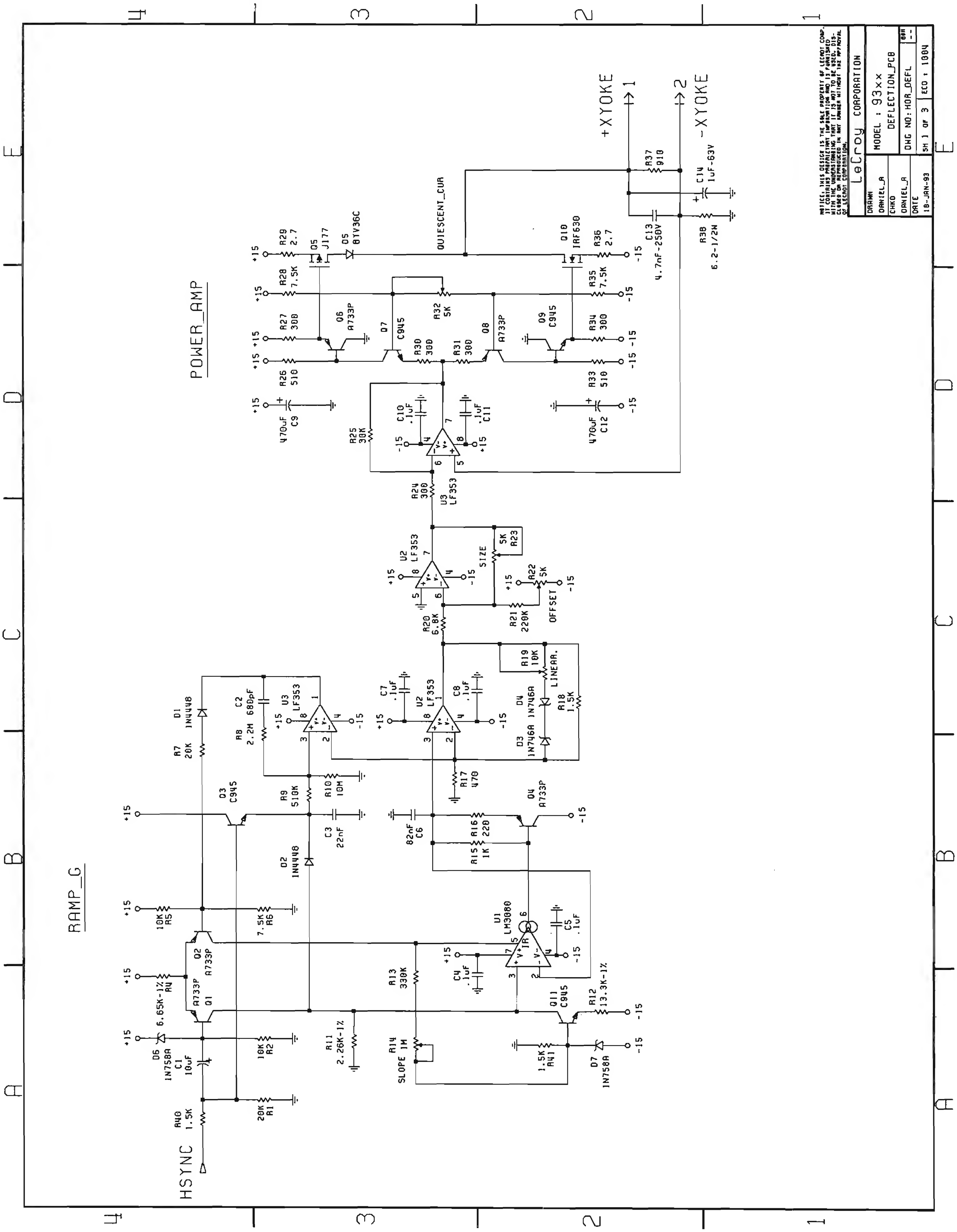
PART: F9300-8 **DESC: PCMCIA 3 HARD DISK CONTROLLER**

Location	Part Number	Description
A1	205750000	C16R4L
A2	205750000	C16L8L
A3	SM201178175	SM74HCT175
A4	SM208470358	SMLM358
A5	SM208780109	SM1109-12
A6	SM200178002	SM74HCT02
A7	SM207170036	SM74HCT365
A8	SM207170036	SM74HCT365
A9	SM206885245	SM74ABT245
A10	SM200178374	SM74HCT374
A11	SM200178374	SM74HCT374
A12	SM207170036	SM74HCT365
C1	SM661207103	SM.01uFS
C2	SM661207103	SM.01uFS
C3	SM661207104	SM.1uFS
C4	SM661207104	SM.1uFS
C5	SM666377226	SM22uF-15V
C6	SM666327225	SM2.2uF-20V
C7	SM661207104	SM.1uFS
C8	SM661207103	SM.01uFS
C9	SM661255101	SM100pFS
C10	SM661207104	SM.1uFS
C11	SM661207103	SM.01uFS
C12	SM666377226	SM22uF-15V
C13	SM666377226	SM22uF-15V
C14	SM661207103	SM.01uFS
C15	SM661207103	SM.01uFS
C16	SM661207103	SM.01uFS
C17	SM661207104	SM.1uFS
C18	SM661207104	SM.1uFS
C19	SM661207103	SM.01uFS
C20	SM661207103	SM.01uFS
C21	SM661207103	SM.01uFS
J1	454511040	2x20-RA-M-RE
J2	330100100	2x34-RA-CGE

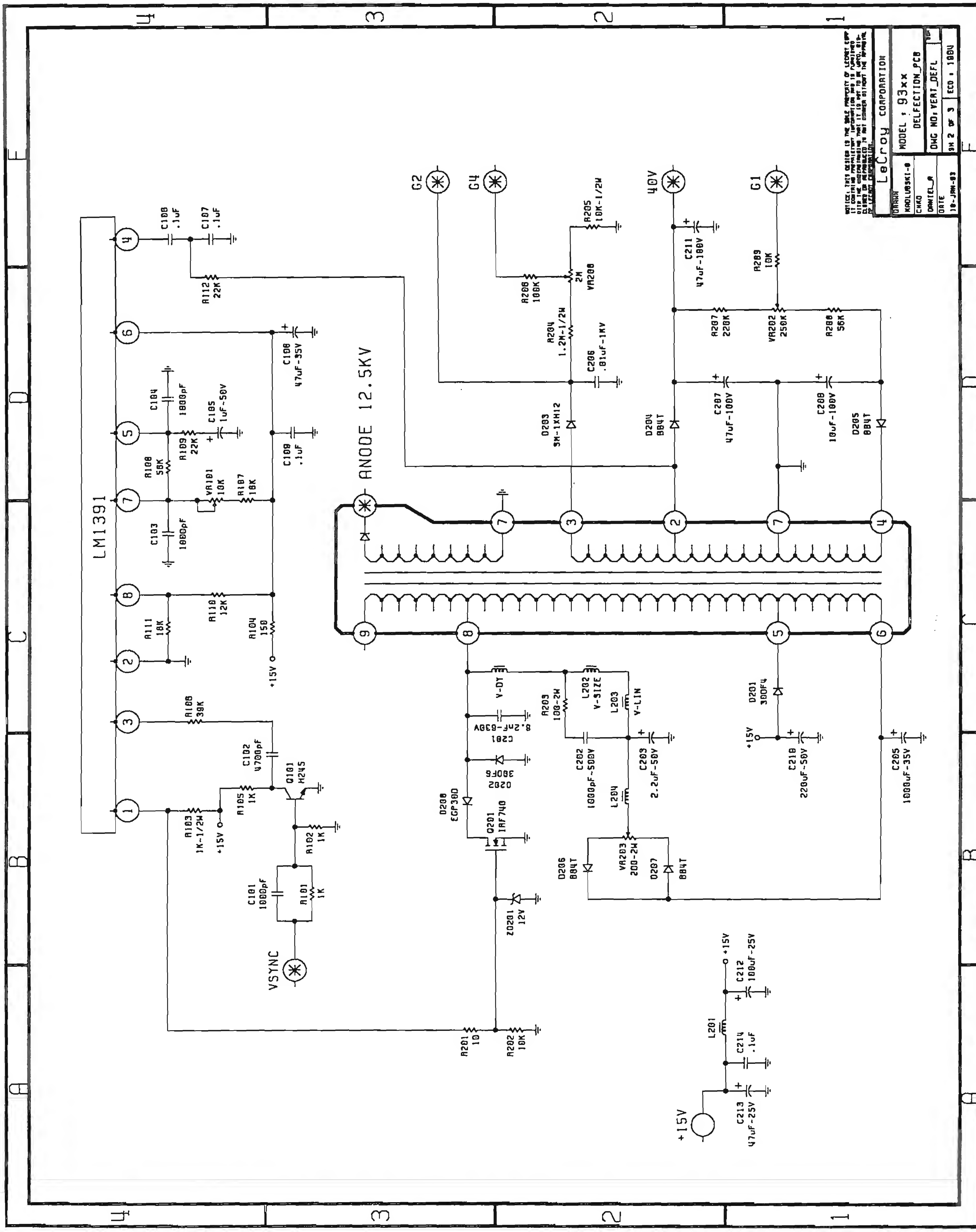
Location	Part Number	Description
L1	SM300056332	SM33uH
Q1	SM280171005	MTD10N05E
Q2	SM275330858	BC858C
R1	SM652101334	SM330KS
R2	SM652101103	SM10KS
R3	SM652101104	SM100KS
R4	SM652101102	SM1KS
R5	SM652101103	SM10KS
R6	SM652101103	SM10KS
R7	SM652101103	SM10KS
R8	SM652101103	SM10KS
R9	SM652101103	SM10KS
R10	SM652101103	SM10KS
R11	SM652101220	SM22S
R12	SM652101103	SM10KS
R13	SM652101334	SM330KS
R14	SM652101102	SM1KS
R15	SM652101104	SM100KS
R16	SM652101334	SM330KS
R17	SM652101103	SM10KS
R18	SM652101103	SM10KS
R19	SM652101103	SM10KS
R20	SM652101103	SM10KS
R21	SM652101102	SM1KS
R22	SM652101103	SM10KS
R23	SM652101103	SM10KS
R24	SM652101103	SM10KS
R25	SM652101103	SM10KS
R26	SM652101103	SM10KS
R27	SM652101103	SM10KS
S1	SM654101000	SM0S-2P
CR1	SM232032814	HSMS2814
CR2	SM232032814	HSMS2814
CR3	SM232032814	HSMS2814
CR4	SM232032814	HSMS2814

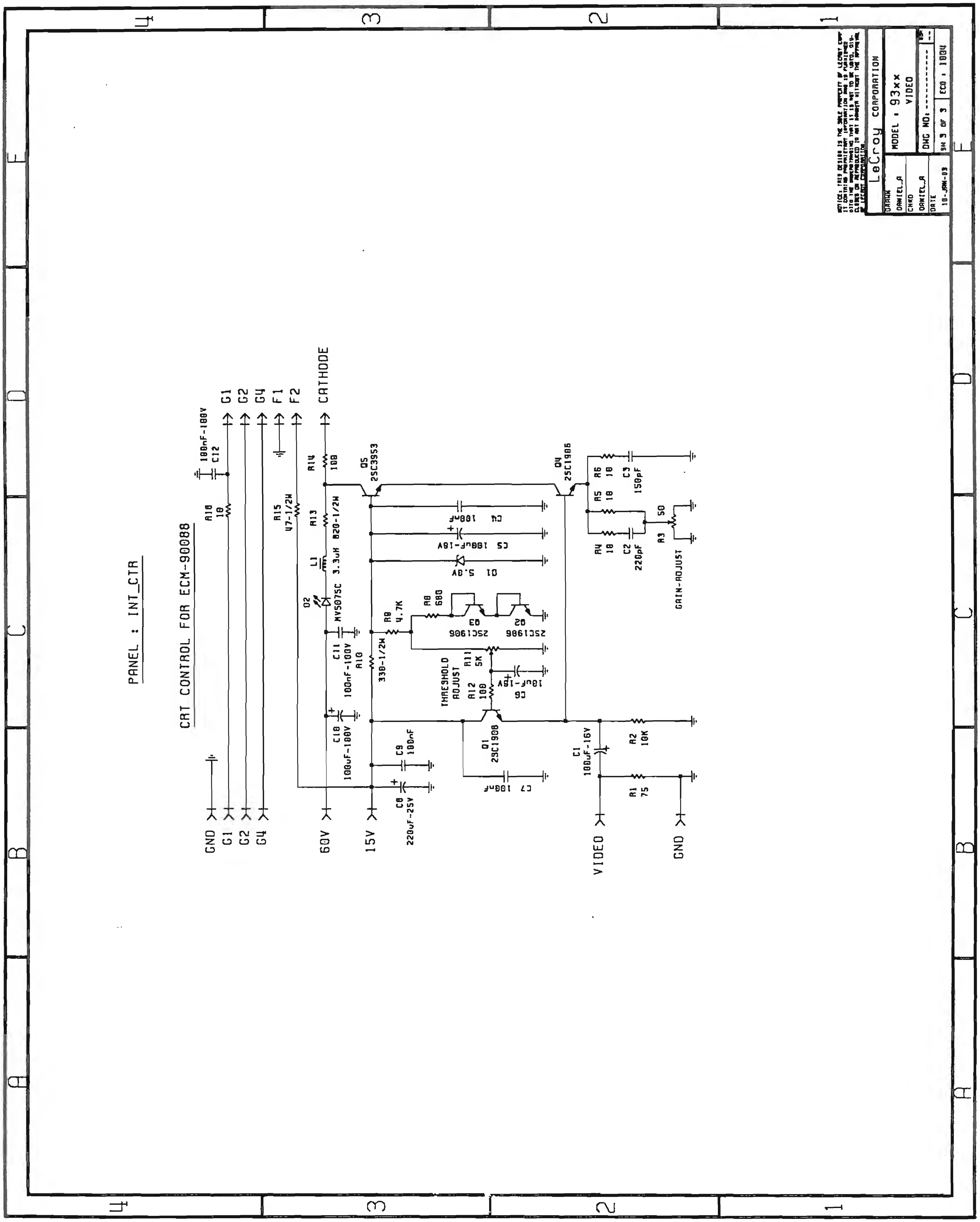
PART: F9300-8 **DESC: PCMCIA III HARD DISK CONTROLLER**

Component	Part Description	Qty Per Assembly
205750000	IC AND-OR GATE ARRAY 16V8	2
330100100	PCMCIA HEADER ASS'Y TOP/LEFT	1
389340009	AUTO-ADHES. RUBBER BAND	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
550120606	SCREW OVAL HD PHIL M2X6	4
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	4
552120100	NUT HEX M2X0.5D	4
594230002	CABLE CLIP ADHESIVE BACK	1
709300811	9300-8 PCMCIA III CONT.BRACKET	1
709300821	9300-8 PCMCIA III CONT. COVER	1
709300831	9300-8 PCMCIA III CONTR. LABEL	1
719300803	PC BD PREASS'Y 9300-8	1
SM200178002	IC 2-INPUT NOR HCT02	1
SM200178374	IC D-TYP FLOP 74HCT374	2
SM201178175	IC QUAD D FLIP/FLOP 74HCT175	1
SM206885245	IC BUS TRANSCVR ABT245	1
SM207170036	IC HEX BUFFER 3-ST. PC74HCT365	3
SM208470358	IC DUAL OP AMP 358D	1
SM208780109	IC MICROPOWER DC-DC CONV.	1
SM232032814	DIODE 2814	4
SM275330858	TRANSISTOR PNP BC858C	1
SM280171005	TRANS POWER MOSFET MTD10N05E	1
SM300056332	INDUCTOR WOUND 33 UH	1
SM652101102	RES CHIP (E24) 1% 1 K	3
SM652101103	RES CHIP (E24) 1% 10 K	18
SM652101104	RES CHIP (E24) 1% 100 K	2
SM652101220	RES CHIP (E24) 1% 22 OHMS	1
SM652101334	RES CHIP (E24) 1% 330 K	3
SM654101000	CHIP JUMPER ZERO OHMS	1
SM661207103	CAP CERA CHIP 20% .01UF (0805)	10
SM661207104	CAP CERA CHIP 20% .1 UF	6
SM661255101	CAP CERA CHIP 5% 100 PF	1
SM666327225	CAP MOLD TANT CHIP 2.2 UF	1
SM666377226	CAP MOLD TANT CHIP 22 UF	3



POWER_AMP
RAMP_G
HSYNC
+XYOKE
-XYOKE
QUIESCENT_CUR
LeCroy CORPORATION
MODEL : 93xx
DEFLECTION_PCB
DWG NO: HOR_DEFL
SH 1 OF 3
ECO : 1004
DRAWN DANIEL_A
CHKD DANIEL_A
DATE 18-JAN-93


LeCroy CORPORATION
MODEL : 93xx
DELFECTION_PCB
DWG NO: VERT_DEFL
LM1391
ANODE 12.5KV
VSYNC
G2
G4
40V
G1
+15V


PANEL : INT_CTR
CRT CONTROL FOR ECM-90088
GND
G1
G2
G4
60V
15V
VIDEO
GND
G1
G2
G4
F1
F2
CATHODE
C12 100nF-100V
R18 10
R15 47-1/2W
R13 820-1/2W
R14 100
Q5 2SC3953
Q4 2SC1906
L1 3.3uH
D2 MV5075C
C11 100nF-100V
R10 330-1/2W
C10 100uF-100V
C9 100nF
C8 220uF-25V
C4 100nF
C5 100uF-10V
D1 5.0V
R9 4.7K
R8 680
Q3 2SC1906
Q2 2SC1906
R11 5K
R12 100
THRESHOLD ADJUST
C6 10uF-10V
Q1 2SC1908
C7 100nF
C1 100uF-16V
R2 10K
R1 75
R6 10
C3 150pF
R5 10
R4 10
C2 220pF
R3 50
GAIN-ADJUST
LeCroy CORPORATION
MODEL : 93xx
VIDEO
DRAWN DANIEL_A
CHKD DANIEL_A
DATE 18-JAN-93
DWG NO:
SH 3 OF 3
ECO : 1804

PART : F93XX-DEFLECTION

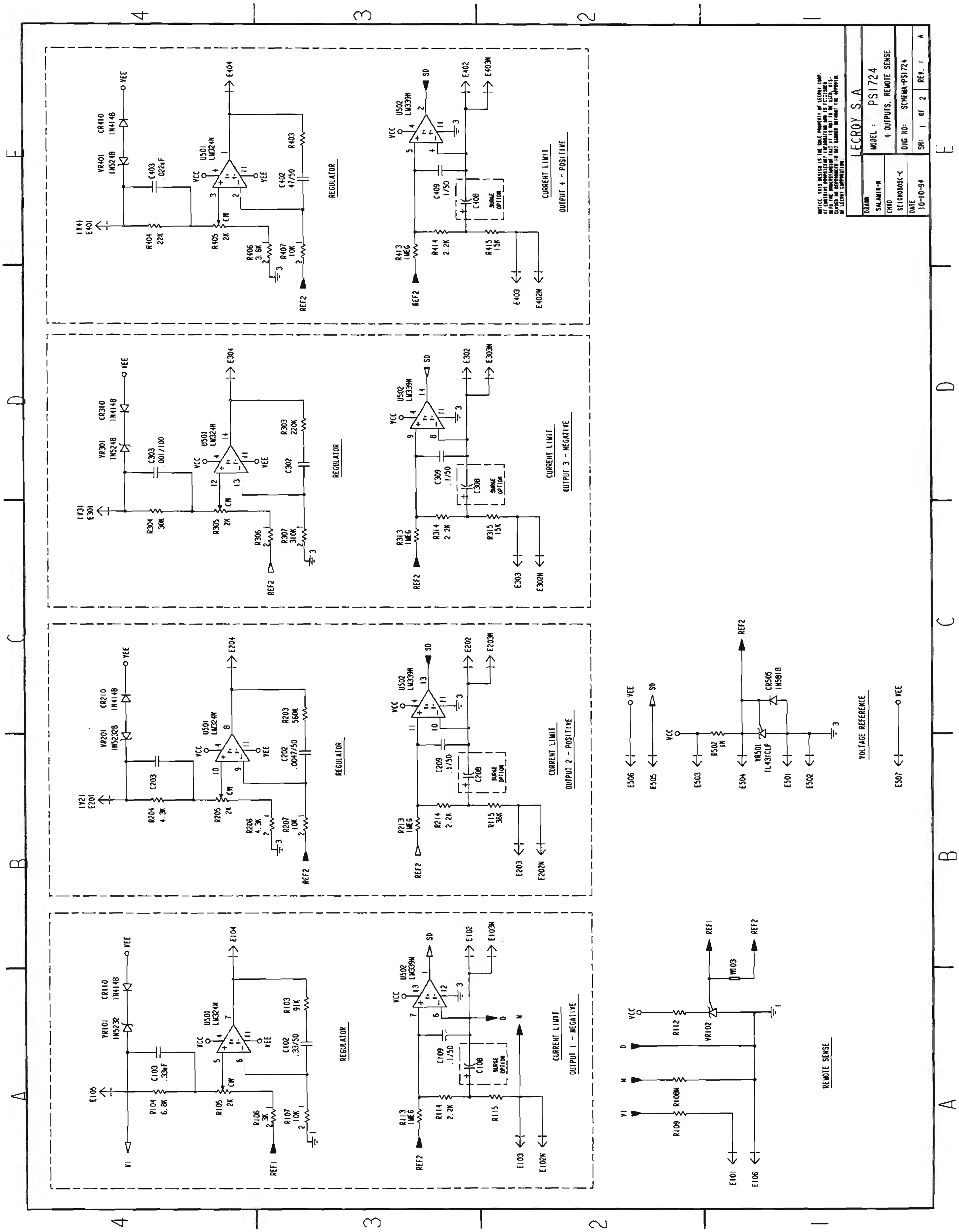
Location	Description	Location	Description
----------	--------------	----------	--------------
C1	10uF	D202	30DF6
C2	680pF	D203	SM-1XH12
C3	22nF	D204	BB4T
C4	.1uF	D205	BB4T
C5	.1uF	D206	BB4T
C6	82nF	D207	BB4T
C7	.1uF	L201	5nH
C8	.1uF	V-DY	V-DY
C9	470uF	L202	V-SIZE
C10	.1uF	L203	V-LIN
C11	.1uF	L204	5nH
C12	470uF	Q1	A733P
C13	4.7nF250V	Q2	A733P
C14	1uF-63V	Q3	C945
C101	1000pF	Q4	A733P
C102	4700pF	Q5	J177
C103	1000pF	Q6	A733P
C104	1000pF	Q7	C945
C105	1uF-50V	Q8	A733P
C106	.1uF	Q9	C945
C107	.1uF	Q10	IRF630
C108	47uF-35V	Q11	C945
C109	.1uF	Q101	H245
C201	8.2nF-630V	Q201	IRF740
C202	1000pF-500V	R1	20K
C203	2.2uF-50V	R2	10K
C205	1000uF-35V	R4	6.65K-1%
C206	.01uF-1KV	R5	10K
C207	47uF-100V	R6	7.5K
C208	10uF-100V	R7	20K
C210	220uF-50V	R8	2.2M
C211	47uF-100V	R9	510K
C212	100uF-25V	R10	10M
C213	47uF-25V	R11	2.26K-1%
C214	.1uF	R12	13.3K-1%
D1	1N4448	R13	510K
D2	1N4448	R14	1M
D3	1N746A	R15	1K
D4	1N746A	R16	220
D5	BYV36C	R17	470
D6	1N758D	R18	1.5K
D7	1N758D	R19	10K
D8	1N5245B	R20	6.8K
D201	30DF4	R21	220K

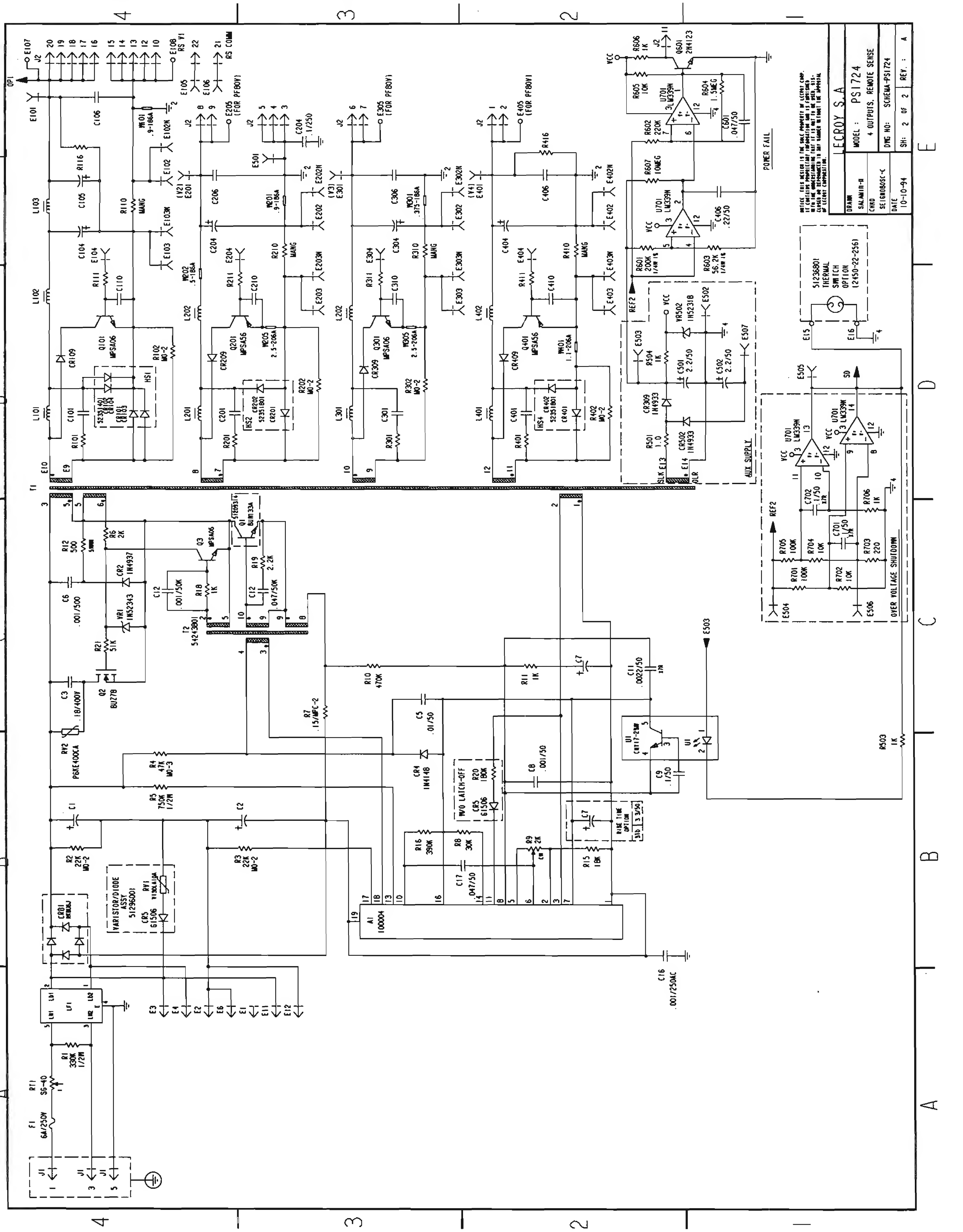
PART : F93XX-DEFLECTION

Location	Description
R22	5K
R23	5K
R24	300
R25	30K
R26	510
R27	300
R28	7.5K
R29	2.7
R30	300
R31	300
R32	5K
R33	510
R34	300
R35	7.5K
R36	2.7
R37	910
R38	6.2-1/2W
R40	1.5K
R41	1.5K
R42	7.5K
R101	1K
R102	1K
R103	1K-1/2W
R104	150
R105	1K
R106	39K
R107	18K
R108	56K
R109	22K
R110	12K
R111	18K
R112	22K
R201	10
R202	10K
R203	100-2W
R204	1.2M-1/2W
R205	10K-1/2W
R206	100K
R207	220K
R208	56K
R209	10K
T201	HT
U1	LM3080
U2	LF353
U3	LF353
VR101	10K
VR202	250K
VR203	200-2W
VR206	2M
ZD201	12V

PART : F93XX-VIDEO

Location	Description
C1	100uF-16V
C2	220pF
C3	150pF
C4	100nF
C5	100uF-16V
C6	10uF-16V
C7	100nF
C8	220uF-25V
C9	100nF
C10	100uF-100V
C11	100nF-100V
C12	100nF-100V
D1	5.0V
D2	MV5075C
L1	3.3uH
Q1	2SC1906
Q2	2SC1906
Q3	2SC1906
Q4	2SC1906
Q5	2SC3953
R1	75
R2	10K
R3	50
R4	10
R5	10
R6	10
R8	680
R9	4.7K
R10	330-1/2W
R11	5K
R12	100
R13	820-1/2W
R14	100
R15	47-1/2W
R16	10


REGULATOR
CURRENT LIMIT
OUTPUT 1 - NEGATIVE
OUTPUT 2 - POSITIVE
OUTPUT 3 - NEGATIVE
OUTPUT 4 - POSITIVE
VOLTAGE REFERENCE
REMOTE SENSE
LECROY S.A
MODEL : PS1724
4 OUTPUTS, REMOTE SENSE
DWG NO: SCHEMA-PS1724
SH: 1 OF 2
REV. : A
DATE 10-10-94


LECROY S.A.
MODEL : PS1724
4 OUTPUTS, REMOTE SENSE
DRAWN SALAMIN-M
DWG NO: SCHEMA-PS1724
SH: 2 OF 2
REV.: A
DATE 10-10-94

PART: M935X **DESC: MECHANICAL FOR 9354A/T**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
315910006	COMBI FILTER WITH FUSES - 6AMP	1
377051005	LABEL "DANGER-------ONLY"	1
377131001	LABEL (GROUND SYMBOL)	1
433162630	FUSE SLO-BLO 250V 6.3AMP	2
485023462	FOOT BUMPON GREY	4
485123001	BUMPER (FOOT) SQUARE GREY RUB	2
530301009	BLK HANDLE W/2 BLACK END CAPS	1
550430106	SCREW CYL HD PHIL M3X6	11
550430116	SCREW CYL HD PHIL M3X16	6
550430120	SCREW CYL HD PHIL M3X20	10
550430508	SCREW FLAT HD PHIL M3X8	2
550430706	SCREW ECO-FIX M3X6	7
550440605	SCREW OVAL HD PHIL M4X5	8
550440608	SCREW OVAL PHIL M4X8	7
551430400	WASHER SHAKEPROOF M3	6
551450400	WASHER SHAKEPROOF M5	2
554030101	NUT BANC-LOK TYPE MV M3	7
554035101	CLIP-ON NUT DIAM. 3.5	4
554425003	SCREW S/TAP PHIL M2.5X6 BLACK	6
554435003	SCREW PT PHIL KA35X20	4
554435004	SCREW PT PHIL KA35X10	4
554435005	SCREW CYL HD PHIL 3.5X9.5	4
554440001	SCREW PT PHIL KA 40 X 12	4
554440202	FLAT WASHER M4	4
560032008	SCREW PHILIPS 10-32X1/2	2
594120003	TIEWRAP	1
709300911	LABEL CE	1
7093XX041	FOOT SUPPORT 93XX	2
7093XX051	FOOT 93XX	2
7093XX091	FRONT FRAME BRACKET 93XX	4
7093XX321	MAIN CARD STANDOFF 12MM	2
7093XX902	FAN 93XX-9 ASSEMBLY	1
7093XX931	INTERF. HOLE CLOSURE 93XX-9	2
709424096	INSERTION GUIDE FOR MC	1
780661104	FLAT CABLE 2X7 (4 CM)	1
780671110	FLAT CABLE 2X20 (10 CM)	1
780721105	FLAT CABLE 2X10 (5,5CM)	1
780834509	GROUND CABLE YELLOW/GREEN	1
93XX-DISPLAY	RASTER MONITOR KIT	1
FF93X1	FRONT FRAME DSO 93XX	1
LC93X1	LOWER COVER DSO 93XX	1
PS9351	POWER SUPPLY	1
RP9354-9	REAR PANEL 9354-9	1
UC93X1	UPPER COVER DSO 93XX	1
US9354-3	UPPER SHIELD ASSEMBLY	1

PART: ACCESSORIES-9354 DESC: ACCESSORIES FOR 9354A/T

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
407099008	PLUG FOR AC LINE - ENGLAND	1
433162630	FUSE SLO-BLO 250V 6.3AMP	2
589202200	AC CORD/PLUG FOR GERMANY	1
589203100	AC CORD/"SEV-ASE" PLUG	1
589203218	AC CORD/US-CANADA PLUG	1
597930001	CARTON FOR 93XX	1
597930002	ETHAFOAM FOR 93XX	2
597940014	PLASTIC BAG FOR 94XX & 93XX	2
597940015	MANUAL/ACCESSORY CTN 9400	2
7093XX061	FRONT COVER 93XX	1
931X-RCM-E	931X SERIES REMOTE CONTROL MAN 1	
935X-OM-E	9350/54 OPERATOR'S MANUAL ENG.	1
PP002	PASSIVE PROBE 10 MOHM 10:1	4
PP092	2GS/s ADAPTOR FOR 9354	1

PART: 93XX-FDGP **DESC: GRAPHIC PRINTER & FLOPPY DISK**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
334000402	THERMAL PAPER FOR SEIKO PRINT	1
334000832	THERMAL PRINTER UNIT	1
335023203	FLOPPY DISK DRIVE 31/2"	1
530040005	SLIDE LATCH TAB STYLE	2
550425104	SCREW CYL HD PHIL M2,5X4	4
550430106	SCREW CYL HD PHIL M3X6	6
551430100	FLAT WASHER M3	3
551430400	WASHER SHAKEPROOF M3	4
552430300	NUT OPEN-END ACORN M3	3
554030101	NUT BANC-LOK TYPE MV M3	2
554430002	SCREW S/TAP PHIL M3X5	10
594120003	TIE WRAP	2
709450523	PUSH SWITCH EXTENDER	1
70FD01021	FLOPPY DISK DRIVE SUPPORT	1
70FD01031	FLOPPY DISK DRIVE FRAME	1
70GP01031	GRAPHIC PRINTER FRAME	1
70GP01041	GRAPHIC PRINTER COVER AXLE	1
70GP01051	GRAPHIC PRINTER CUTTER	1
70GP01061	GRAPHIC PRINTER SWITCH BUTTON	1
780210030	DISPLAY POWER CABLE	1
780721022	FLAT CABLE 2X10 (22CM)	1
780791604	FLAT CABLE 2X13 (4CM)	1
780791630	FLAT CABLE 2X13 (30CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
BOX-GP01	GP01 GRAPHIC PRINTER BOX	1
COVER-GP01	GP01 GRAPHIC PRINTER COVER	1
CUP-FD01	FD01 FLOPPY DISK DRIVE CUP	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT	1
F9300-7	LTP 5446 PRINTER CONTROLLER	1
UC93X1-FDGP	UPPER COVER FOR FD/GP OPTIONS	1

PART: 93XX-FD01 **DESC: FLOPPY DISK**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
335023203	FLOPPY DISK DRIVE 31/2"	1
550425104	SCREW CYL HD PHIL M2,5X4	4
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	2
551430400	WASHER SHAKEPROOF M3	2
554030101	NUT BANC-LOCK TYPE MV M3	2
554430002	SCREW S/TAP PHIL M3X5	4
70FD01021	FLOPPY DISK DRIVE SUPPORT	1
70FD01031	FLOPPY DISK DRIVE FRAME	1
780791630	FLAT CABLE 2X13 (30CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
CUP-FD01	FD01 FLOPPY DISK DRIVE CUP	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT. B	1
UC93X1-FD01	UPPER COVER FOR FD01 OPTION	1

PART: 93XX-GP01 **DESC: GRAPHIC PRINTER**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
340000402	THERMAL PAPER FOR SEIKO PRINT	1
334000832	THERMAL PRINTER UNIT	1
530040005	SLIDE LATCH TAB STYLE	2
550430106	SCREW CYL HD PHIL M3X6	4
551430100	FLAT WASHER M3	3
551430400	WASHER SHAKEPROOF M3	4
552430300	NUT OPEN-END ACORN M3	3
554430002	SCREW S/TAP PHIL M3X5	6
594120003	TIE WRAP	2
709450523	PUSH SWITCH EXTENDER	1
70GP01031	GRAPHIC PRINTER FRAME	1
70GP01041	GRAPHIC PRINTER COVER AXLE	1
70GP01051	GRAPHIC PRINTER CUTTER	1
70GP01061	GRAPHIC PRINTER SWITCH BUTTON	1
780210030	DISPLAY POWER CABLE	1
780721022	FLAT CABLE 2X10 (22CM)	1
780791604	FLAT CABLE 2X13 (4CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
BOX-GP01	GP01 GRAPHIC PRINTER BOX	1
COVER-GP01	GP01 GRAPHIC PRINTER COVER	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT	1
F9300-7	LTP 5446 PRINTER CONTROLLER	1
UC93X1-GP01	UPPER COVER FOR GP01 OPTION	1

SECTION 9 MECHANICAL PARTS

9354A, 9354AM, 9354AL, 9354T & 9354TM

Digital Storage Oscilloscope

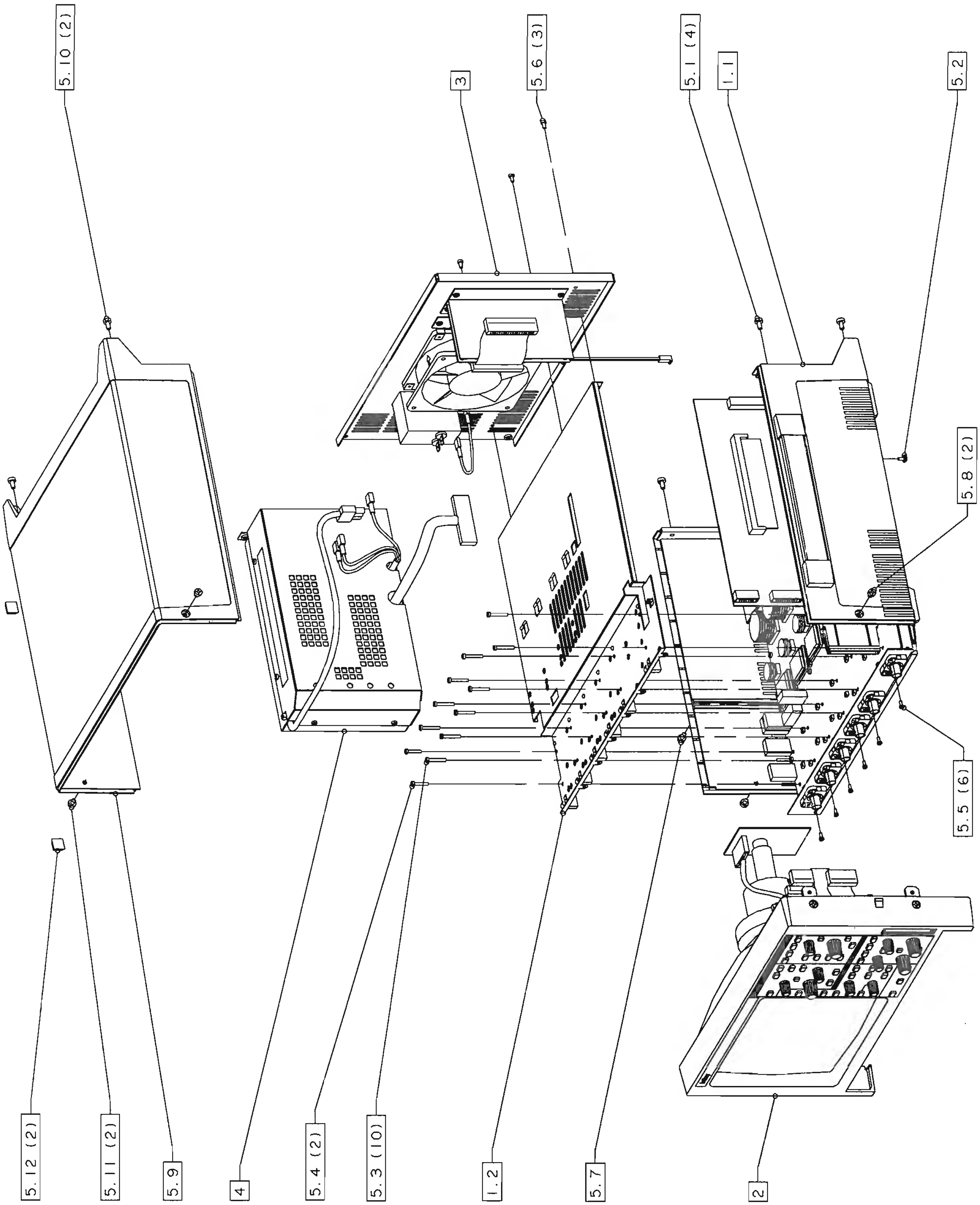


Figure 9.1 : 9354A/T DSO Exploded View

9.1.1	9354A/T Assembly	Part Description	Quantity per Assembly
1.1	9354A/T lower cover assembly	LC93X1	1
1.2	9354A/T upper shield assembly	US9354-3	1
2.	9354A/T front frame assembly		1
3.	9354A/T Rear panel assembly		1
4.	PS9351Power supply	PS9351	1
5.1	Screw oval head M4x8	550 440 608	4
5.2	Screw eco fix M3x6	550 430 706	1
5.3	Screw cyl head M3x20	550 430 120	10
5.4	Screw M3x16	550 430 116	2
5.5	Self tapping screw M2.5x6	554 425 003	6
5.6	Screw M3x6	554 430 706	3
5.7	Screw oval head M4x8	550 440 608	1
5.8	Screw M4x5	550 440 605	2
5.9	9354A/T Upper cover	UC 93X1	1
5.10	Screw oval head M4x8	550 440 608	2
5.11	Screw M4x5	550 440 605	2
5.12	Foot bumpon grey 6 mm	485 023 462	2

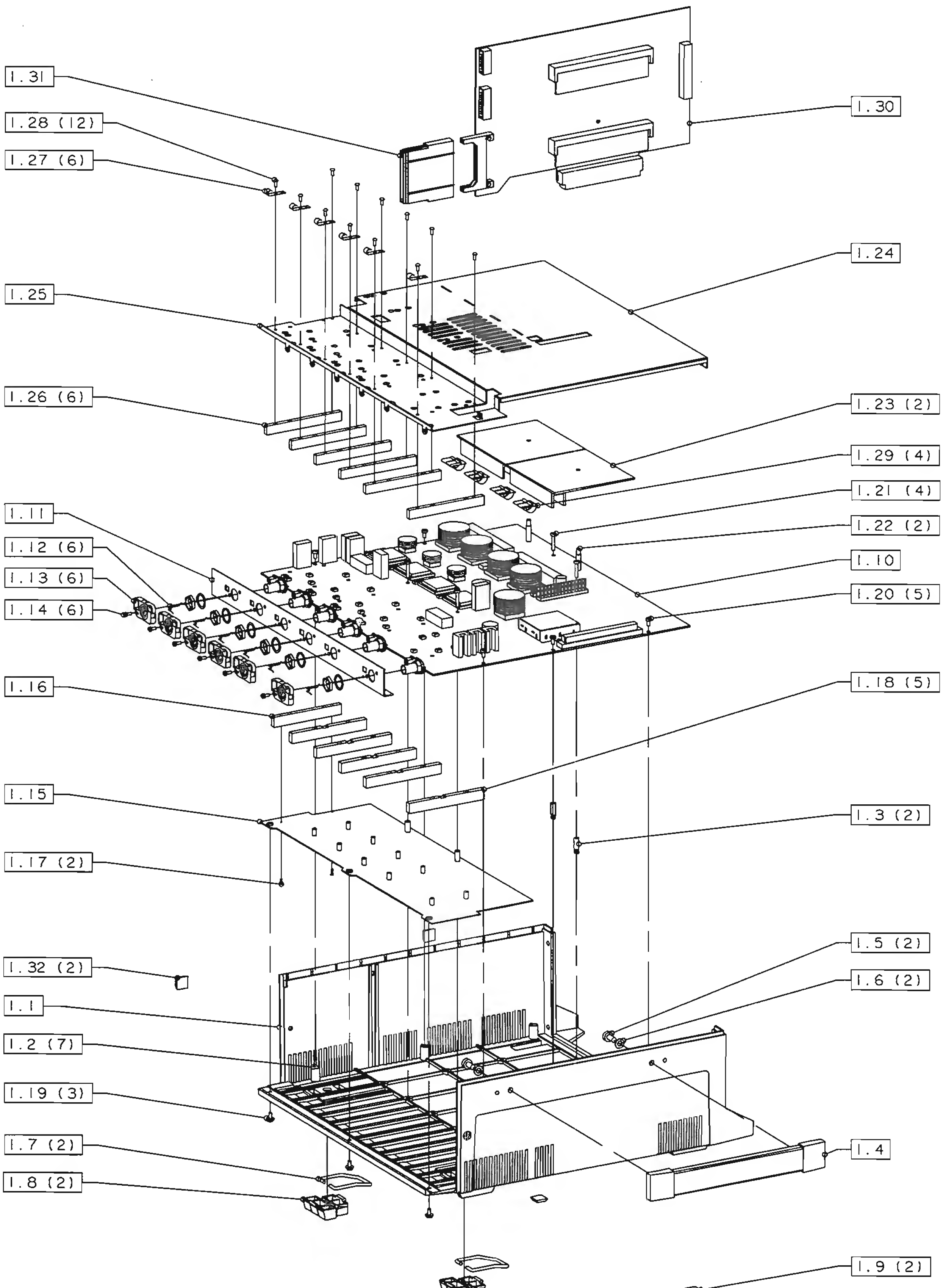


Figure 9.2 : 9354A/T Lower Cover Exploded View

9.2.1	9354A/T Lower Cover Assembly	Part Description	Quantity per Assembly
1.1	Lower cover	LC 93X1	1
1.2	Nut Banc-Lock M3	554 030 101	7
1.3	Main card standoff 12 mm M3	709 3XX 321	2
1.4	Handle with caps	530 301 009	1
1.5	Screw cyl head 10-32 x 1/2	560 032 008	2
1.6	Lockwasher M5	551 450 400	2
1.7	Foot	709 3XX 051	2
1.8	Foot support	709 3XX 041	2
1.9	Foot bumpon grey 3 mm	485 123 001	2
1.10	Main board 9354A/T	F9354-31	1
1.11	Main board panel 9354A/T	FP9354-3	1
1.12	Probe ring contact	709 3XX P91	6
1.13	Probe holder	709 3XX P41	6
1.14	Self tapping screw M2,5x6	554 425 003	6
1.15	9354A/T base shield	709 354 331	1
1.16	Left lower partition	709 354 361	1
1.17	Nail rivet 1.6x6	554 416 000	2
1.18	Lower partition	709 354 351	5
1.19	Screw eco-fix M3x6	550 430 706	3
1.20	Screw cyl head M3x6	550 430 106	5
1.21	Screw cyl head M3x16	550 430 116	4
1.22	Self locking nylon spacer	520 000 118	2
1.23	9354A Acquisition memory card	F9350-21	2
	9354AM Acquisition memory card	F9350M-21	2
	9354AL Acquisition memory card	F9350L-2	2
	9354T Acquisition memory card	F9350T-21	2
	9354TM Acquisition memory card	F9350TM-21	2
1.24	Upper shield assembly	US9354-3	1
1.25	Upper shield	709 354 321	1
1.26	Upper partition shield	709 354 341	6
1.27	Shield contact	709 3XX 371	6
1.28	Nail rivet M2,5x6	554 425 004	12
1.29	Shield finger stock	530 009 002	4
1.30	9354A & 9354T Processor card	F9302-1-4	1
	9354AM & 9354TM Processor	F9302-1-8	1
	9354AL Processor card	F9302-1-16	1
1.31	Memory card insertion guide	709 424 096	1
1.32	Self adhesive foot	485 023 462	2

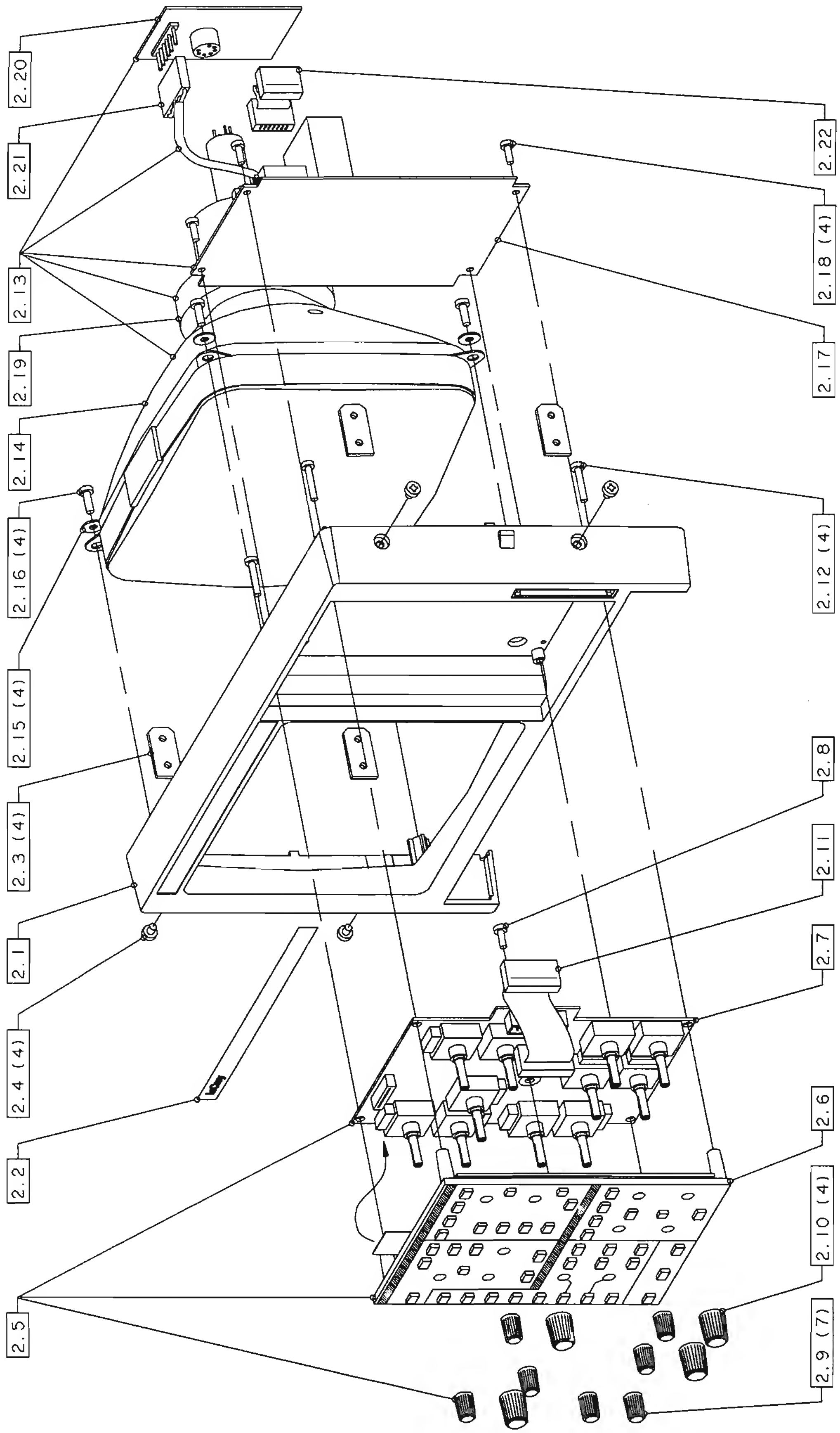


Figure 9.3 : 9354A/T Front Frame Exploded View

9.3.1	9354A/T Front Panel Assembly	Part Description	Quantity per Assembly
2.1	Front frame	FF 93X1	1
2.2	Front label 9354A	709 354 A16	1
	Front label 9354AM	709 354 AM16	1
	Front label 9354AL	709 354 AL16	1
	Front label 9354T	709 354 T16	1
	Front label 9354TM	709 354 TM16	1
2.3	Front frame bracket	709 3XX 091	4
2.4	Screw oval head M4x5	550 440 605	4
2.5	Front panel assembly	F9354-5	1
2.6	Front panel keyboard ass'y	729 354 513	1
2.7	Front panel pcb ass'y	9354-5	1
2.8	Screw PT KA 35x10	554 435 004	1
2.9	Knob diameter 10mm	709 3XX 511	7
2.10	Knob diameter 14mm	709 3XX 521	4
2.11	20 lines flat cable	780 721 105	1
2.12	Screw PT KA 35x20	554 435 003	4
2.13	Raster monitor kit	93XX-Display	1
2.14	9 inch CRT	93XX-CRT	1
2.15	Flat washer M4	554 440 202	4
2.16	Screw PT KA 40x12	554 440 001	4
2.17	Deflection board	93XX-Deflection	1
2.18	Screw PT KA 35x10	554 435 004	4
2.19	Deflection yoke	93XX-Yoke	1
2.20	Video board	93XX-Video	1
2.21	Monitor cable		1
2.22	14 lines flat cable	780 661 104	1

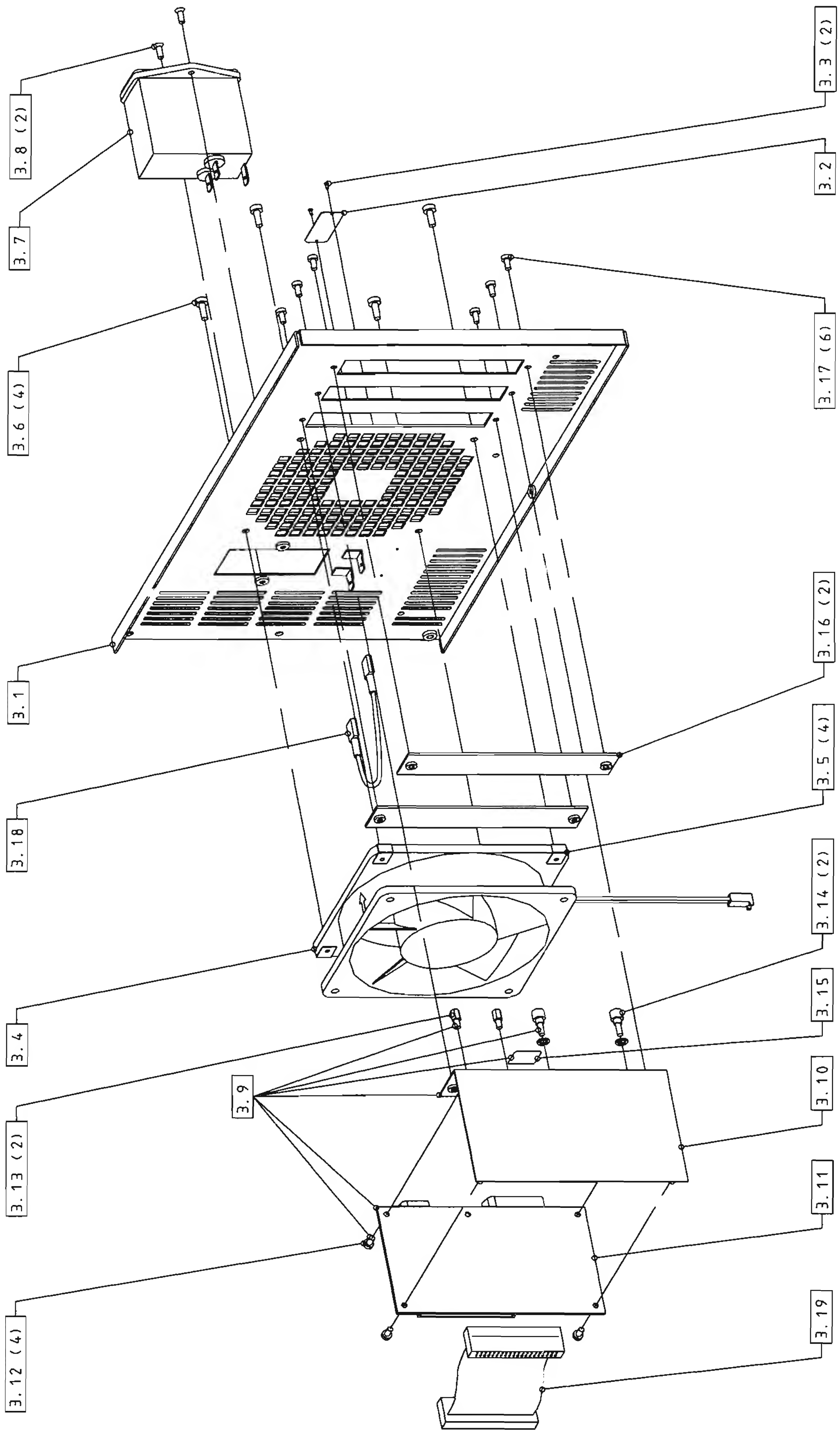


Figure 9.4 : 9354A/T Rear Panel Exploded View

9.4.1	9354A/T Rear Panel Assembly	Part Description	Quantity per Assembly
3.1	Rear panel	RP 9354-9	1
3.2	Serial number plate	709 354 913	1
3.3	Taping screw	554 500 001	2
3.4	Fan asssembly	709 3XX 902	1
3.5	Clip on nut 3.5	554 035 101	4
3.6	Screw 3.5 X 9.5	554 435 005	4
3.7	Line input module	315 910 006	1
	Fuse holder		1
	Fuse 6.3A / 250 V	433 162 630	2
3.8	Screw flat head M3x8	550 430 508	2
3.9	RS232/GPIB interface assembly	F9300-4	1
3.10	Interface card bracket	709 300 411	1
3.11	Interface card	9300-4	1
3.12	Screw cyl head M3x6	550 430 106	4
	Washer Shakeproof M3	551 430 400	4
3.13	Mounting hardware	455 980 002	2
3.14	Connector kit	435 521 024	2
3.15	Label " RS232C "	709 300 421	1
3.16	Interface hole closure	709 3XX 931	1
3.17	Screw cyl head M3x6	550 430 106	4
	Washer shakeproof M3	551 430 400	1
3.18	Ground wire cable	780 834 509	1
3.19	40 lines flat cable	780 671 110	1

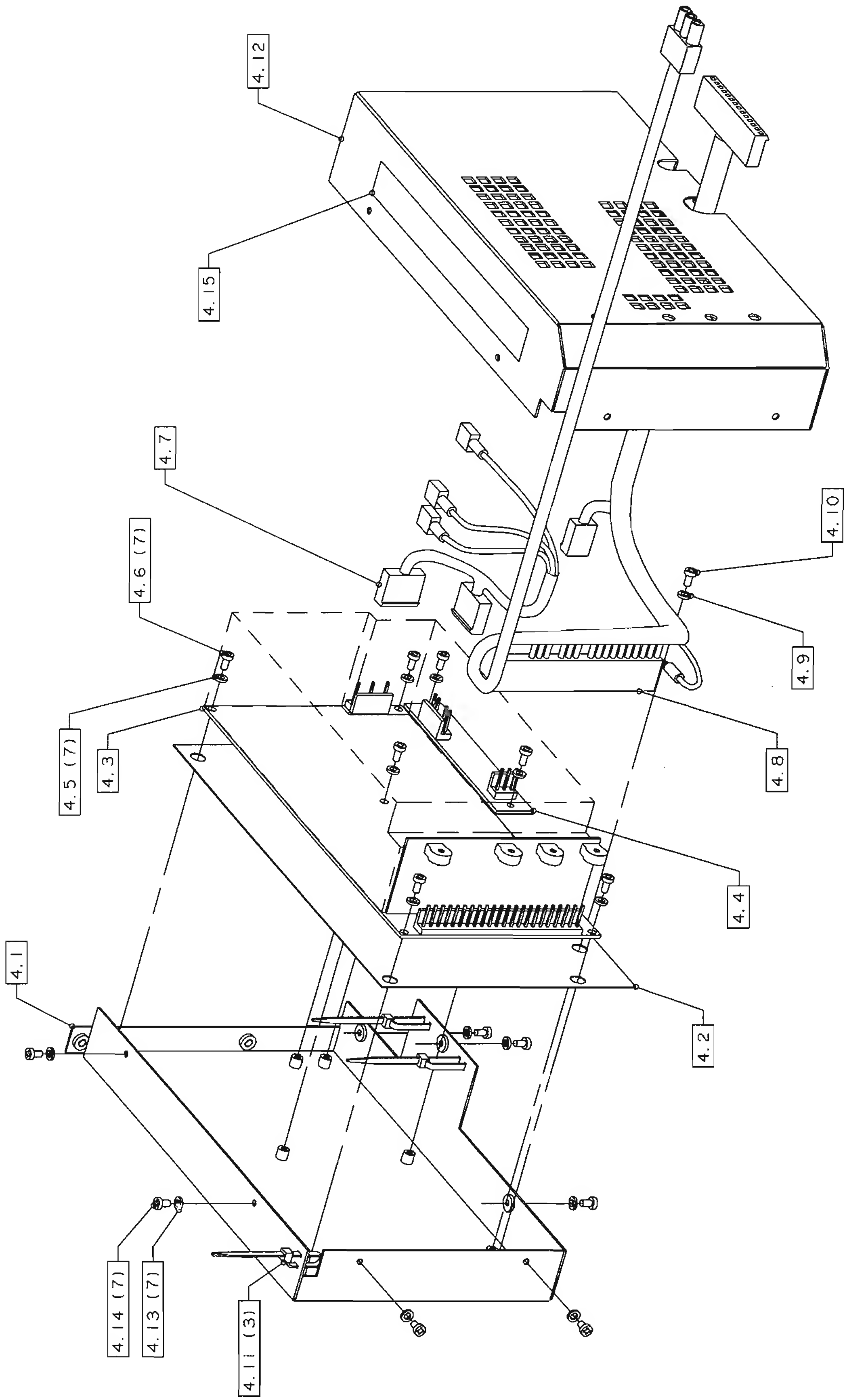


Figure 9.5 : PS9351 Power Supply Exploded View

9.5.1	Power supply PS9351	Part Description	Quantity per Assembly
4.1	Power supply bracket	709 351 041	1
4.2	Power supply insulator	709 351 031	1
4.3	Power supply board	PS 1724	1
4.4	Power supply line sync card	FPS9351-2	1
4.5	Lockwasher M3	551 430 400	7
4.6	Screw cyl head M3x6	550 430 106	7
4.7	Power supply input cable	780 811 622	1
4.8	Power supply output cable	780 872 972	1
4.9	Lockwasher M3	551 430 400	1
4.10	Screw cyl head M3x6	550 430 106	1
4.11	Tie wrap	594 120 006	3
4.12	Power supply cover	709 351 051	1
4.13	Lockwasher M3	551 430 400	7
4.14	Screw cyl head M3x5	550 430 105	7
4.15	Label " Danger....only "	377 051 005	1

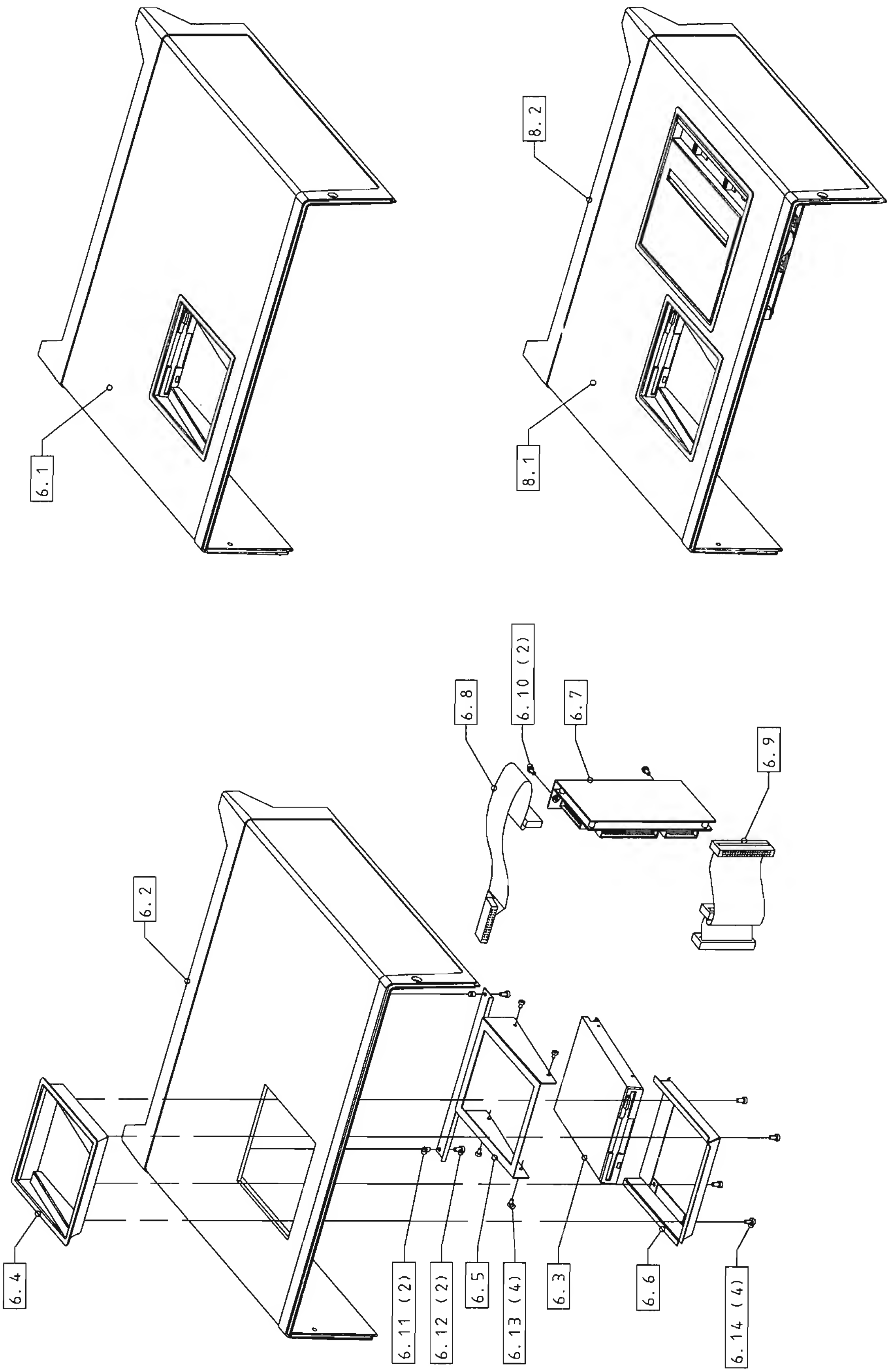


Figure 9.6 : FD01 Floppy Option

9.6.1	FD01 Floppy Option	Part Description	Quantity per Assembly
6.1	Floppy drive option	93XX-FD01	1
6.2	Upper cover	UC93X1-FD01	1
6.3	Floppy drive	335 023 203	1
6.4	Cup	CUP-FD01	1
6.5	Support	70FD01021	1
6.6	Frame	70FD01031	1
6.7	Floppy/Printer/Cent interface	F9300-6	1
6.8	Flat cable 26 P	780 791 630	1
6.9	Flat cable 40 P	780 801 015	1
6.10	Screw M3x6	550 430 106	2
	Washer M3	551 430 400	2
6.11	Nut banc lock M3	554 030 101	2
6.12	Screw M3x6	550 430 106	2
6.13	Screw M2.5x4	550 425 014	4
6.14	Screw self taping M3x5	554 430 002	4
8.1	Floppy and Printer options	93XX-FDGP	1
8.2	Floppy&Printer Upper cover	UC93X1-FDGP	1

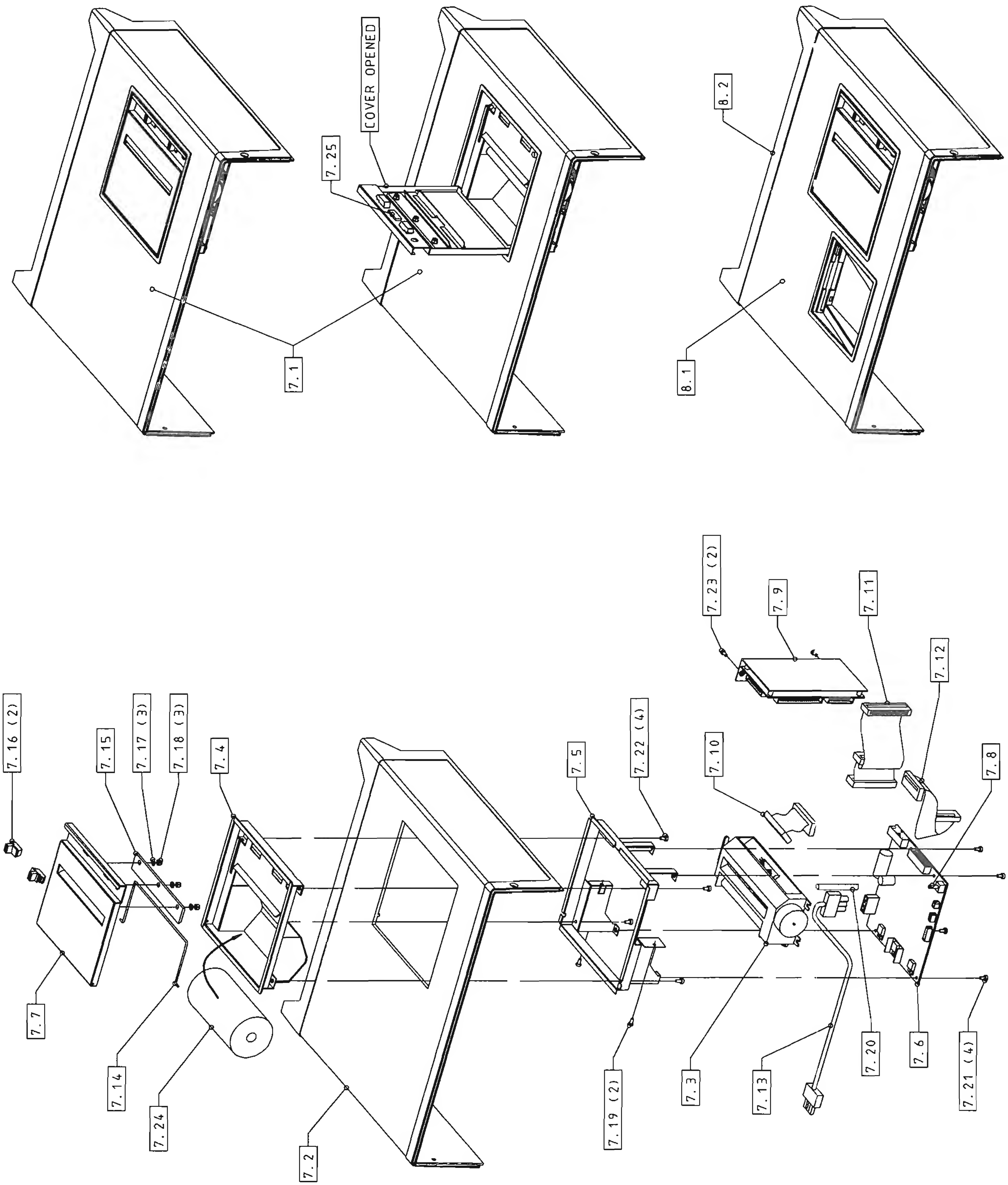


Figure 9.7 : GP01 Printer Option

9.7.1	**GP01 Printer Option**	**Part Description**	**Quantity per Assembly**
7.1	Graphic printer option	93XX-GP01	1
7.2	Upper cover	UC93X1-GP01	1
7.3	Graphic printer	334 000 832	1
7.4	Box	BOX-GP01	1
7.5	Frame	70GP01031	1
7.6	Printer interface card	F9300-7	1
7.7	Cover	COVER-GP01	1
7.8	Switch push button	709 450 523	1
7.9	Floppy/Printer/Cent interface	F9300-6	1
7.10	Flat cable 26 P	780 791 604	1
7.11	Flat cable 40 P	780 801 015	1
7.12	Flat cable 20 P	780 721 022	1
7.13	Power supply cable	780 210 030	1 not used
7.14	Cover Axle	70GP01041	1
7.15	Cutter	70GP01051	1
7.16	Slide latch	530 040 005	2
7.17	Flat washer M3	551 430 100	3
7.18	Nut acorn M3	552 430 300	3
7.19	Screw self taping M3x5	554 430 002	2
7.20	Push switch extender	70GP01061	1
7.21	Screw M3x6	550 430 106	4
	Washer M3	551 430 400	4
7.22	Screw M3x5	554 430 002	4
7.23	Screw M3x6	550 430 106	2
	Washer M3	551 430 400	2
7.24	Thermal paper roll	344 000 042	1
7.25	Auto adhesive rubber band		1
8.1	Floppy and Printer options	93XX-FDGP	1
8.2	Floppy&Printer Upper cover	UC93X1-FDGP	1

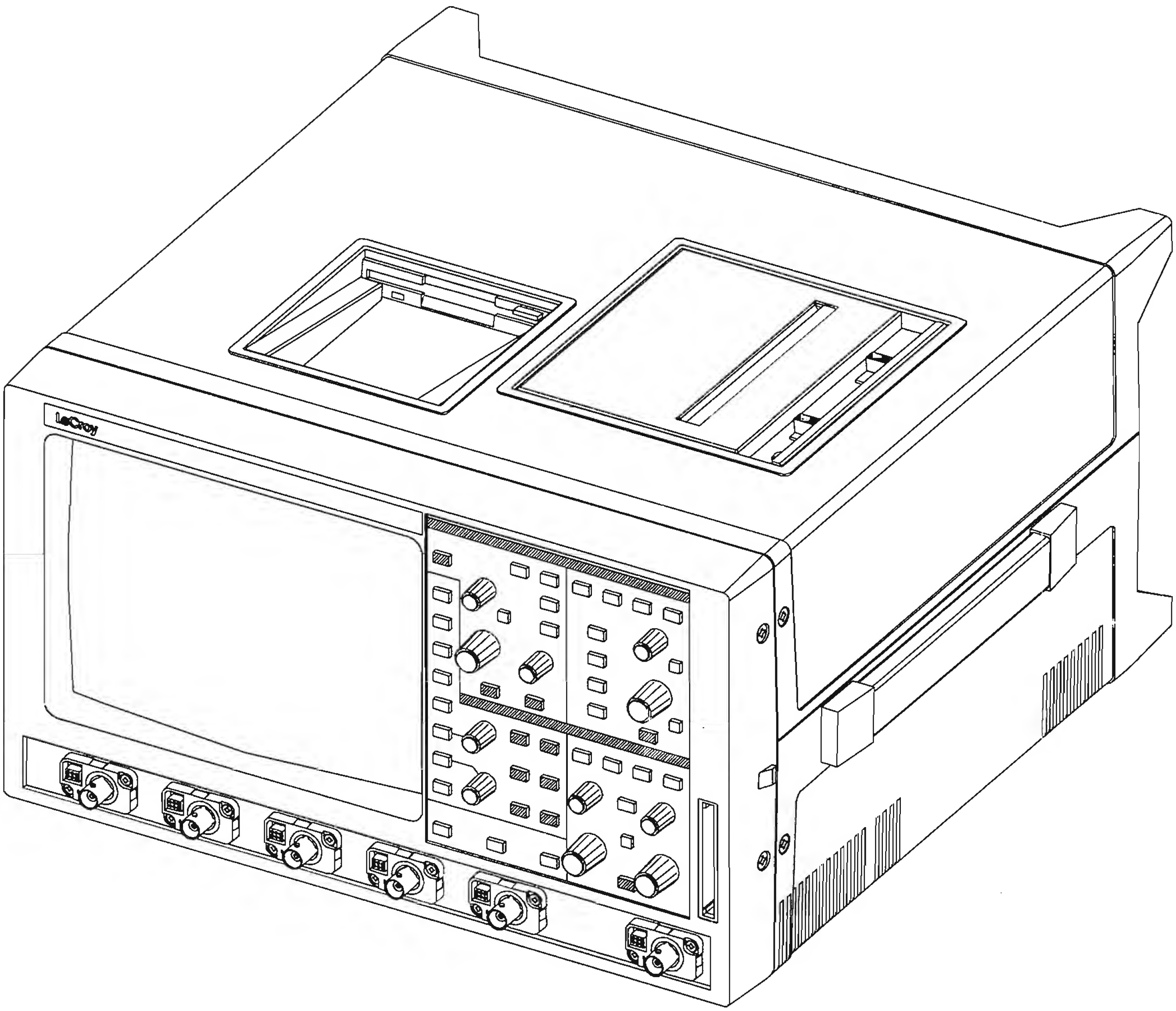


Figure 9.8 : 9354A/T DSO Front View

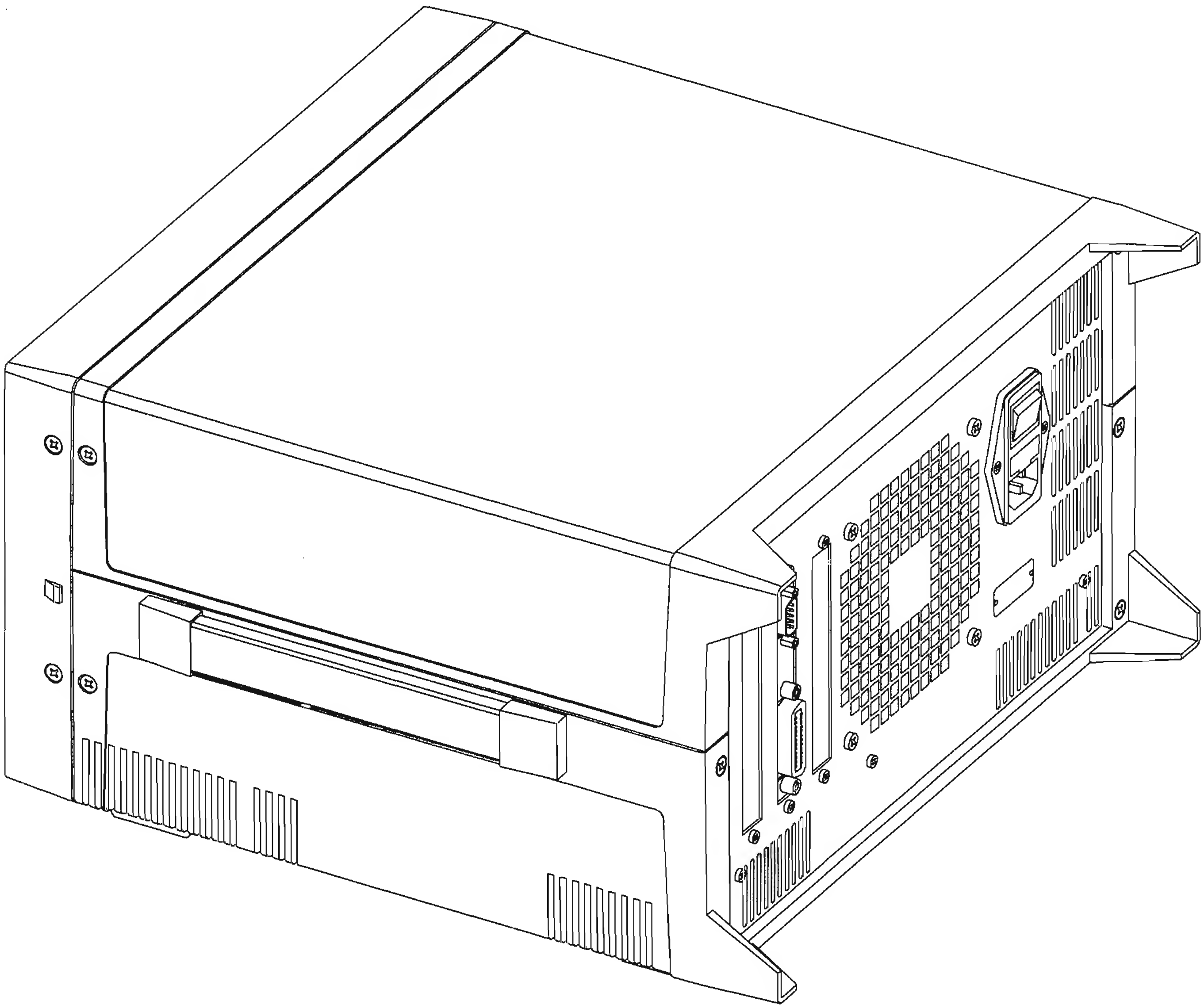


Figure 9.9 : 9354A/T DSO Rear View

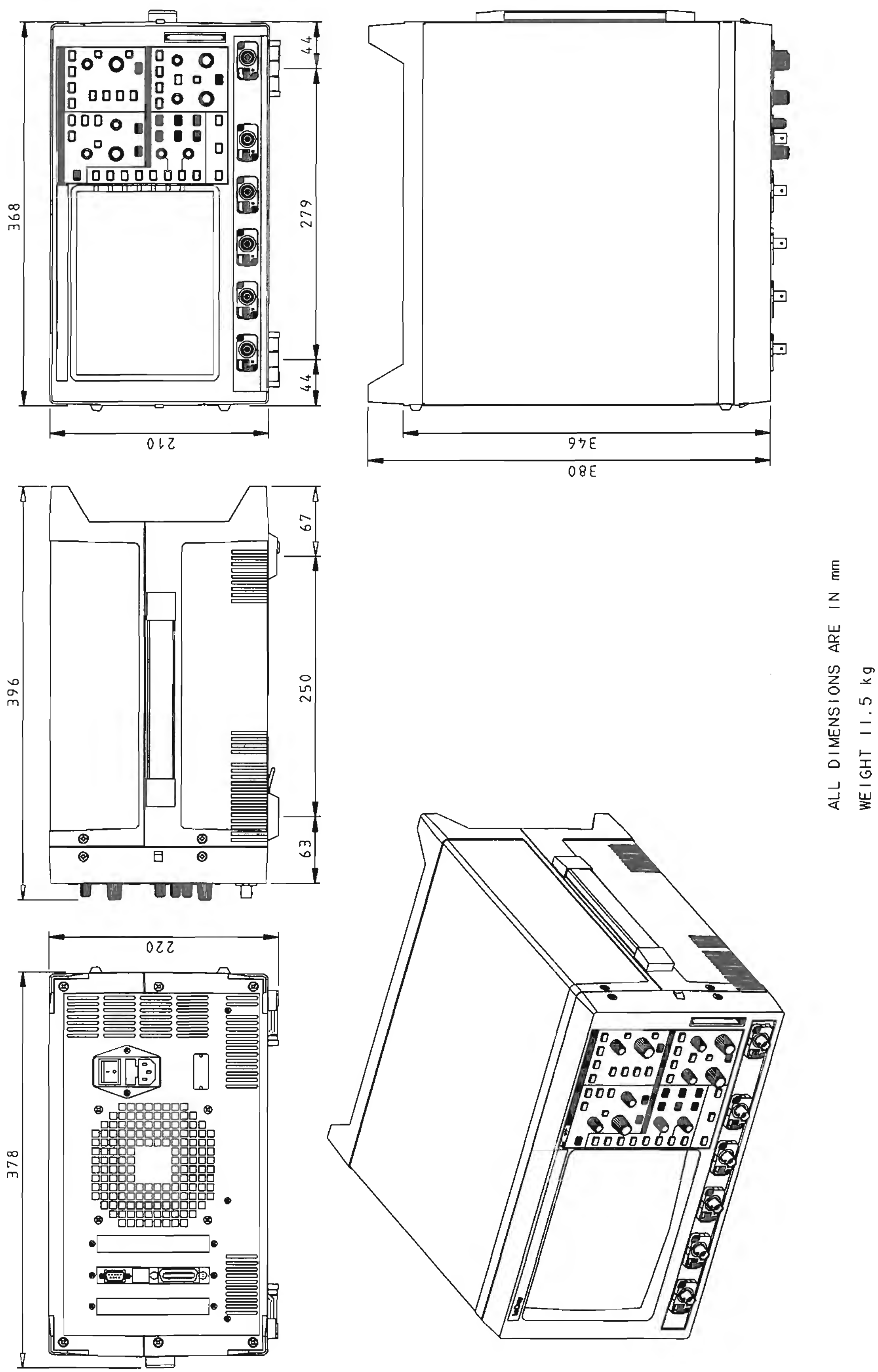


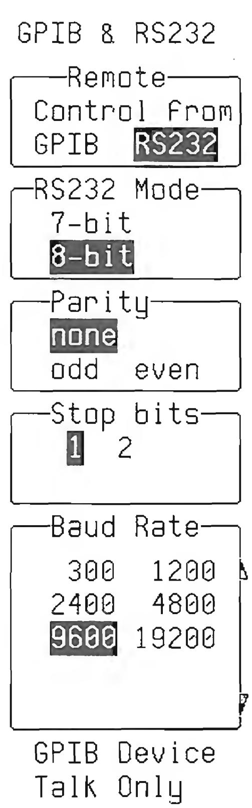
Figure 9.10 : 9354A/T DSO Dimensions

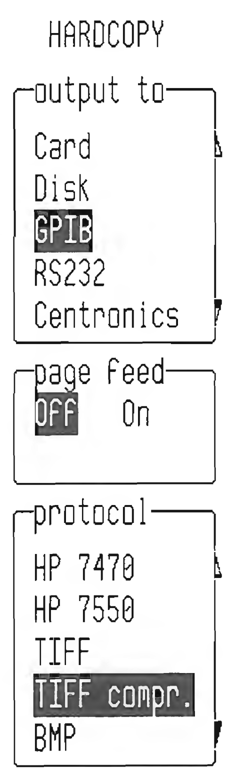
SECTION 10 CONNECTING the 9354A/T to a PLOTTER or a PRINTER

10.1 Introduction

LeCroy oscilloscopes are supplied with a list of plotters and printers known to work with them.
This list is not final, so any suggestions are welcome.

HP plotter responses to some RS-232 configuration commands have been evolved. Consequently, the 9354A/T generation DSO support HP plotters of two types, 7470A and 7550A. The only difference lies in the RS-232 initialization codes. They may however, despite these changes, work with HPGL compatible plotters from other manufacturers. If the HPGL data is used as input for a CAD or word processing system, it might be necessary to remove the data preceding the in command. Before connecting a plotter to a 9354A/T, do not forget to select the appropriate settings in the printer setup menu and the GPIB & RS-232 setup menu.





RS-232 connection

The following settings are assumed for the scope.

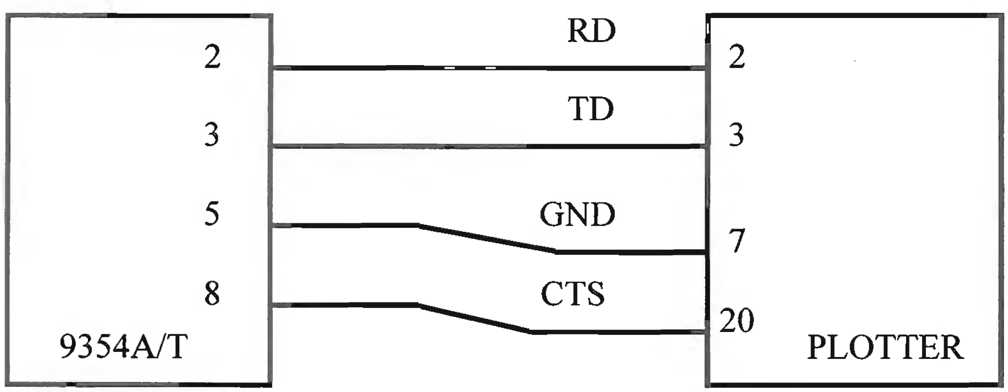
Baud rate	:	9600
Character	:	8 bits
Parity	:	none
Stop bits	:	1

Any exceptions will be mentioned.

RS 232 interface

Pin	1	:	DCD
	2	:	RD
	3	:	TD
	4	:	DTR
	5	:	GND
	6	:	DSR
	7	:	RTS
	8	:	CTS
	9	:	RI

A cable with the following pinout can be used in almost every case:



The cable has D25 connector with male pins on the plotter side, and a D9 connector with female pins on the 9354A/T oscilloscope side.

GPIB Connection

To have a plot done through GPIB initiated with the front panel screen dump push button, you must set the 9354A/T in talk only mode by selecting remote control from RS-232, and the plotter in listen only mode.
If a computer controls the GPIB Bus, both the scope and the plotter must be set in addressed mode (remote control from GPIB).
Remark: the listen only mode does not work on some old HP plotters such as HP7585B or HP7475. The plotter must be set to listener before being able to receive any commands, which is a violation of the GPIB standard.

10.2 Plotters

10.2.1 HP 7470A Plotter

Switch settings:

- RS-232 Connection:
  S1 and S2 : 0 0
  Y/D : D
  A4/US : User selectable
  B4 to B1 : 1 0 1 0

- GPIB listen only:
  A4/US : User selectable
  16 to 1 : 1 1 1 1 1

- GPIB Addressed:
  A4/US : User selectable
  16 to 1 : 0 0 1 1 1

10.2.2 HP 7550A Plotter

Responses to some ESC characters commands are not the same in this plotter as in older HP models like the 7470A. In fact, ESC sequences of commands which give excellent results in the 7470A can prevent any handshake in RS-232.
Problems of this kind have been reported in the case of ESC.R and ESC.@ commands. When combined with ESC.I and ESC.N, ESC.@ breaks up all handshakes.

RS-232 configuration:

- Enter into display 5 (HP-IB MONITOR...).
- Select STANDARD OF STANDARD/ENHANCED.
- Enter into SERIAL sub-menu (display 6)
- For DATA_FLOW, select REMOTE. Either STANDALONE or EAVESDROP may be chosen.
- Enter into display 7 (DUPLEX, PARITY, BAUD).
- Select FULL duplex.
- Configuration PARITY and BAUD rate to the same values as on the DSO.

A standard cable may be used.
Do not start a plot while a sheet of paper is being loaded!

GPIB configuration:

If the scope is in TALK ONLY, the plotter must be in LISTEN ONLY.
Selection will be done at display 5.

Note : Its seems that the plotter must be powered off, then on again, to take any configuration change into account.

10.2.3 Hitachi 672 Graph Plotter (or NSA 672)

As this plotter is compatible with the 7470A, select this mode on the plotter menu page.
Switch settings

- RS-232 Connection:

Sw. A, 1 and 2	:	1 1 (ISO A3) or (ISO A4).
Sw. A, 3 to 8	:	1 0 1 1 0 1
Sw. B	:	1 1 1 1

Note : When switches are set to ISO A4, the pen must be manually repositioned at the top of the page (or plotter reset by powering it off and on) before loading a new sheet of paper.

10.3 Printers

Interfacing is possible through RS-232, GPIB directly, and in option through Centronics. The parallel interface F9300-6 (Centronics) is an option, see section 4.5.

10.3.1 Centronics Printers

Most printers use a Centronics parallel connection which makes direct connection possible if the 9354A/T is equipped with the optional Centronics interface F9300-6 board. If the printer has a Centronics connector then it's a parallel printer, and the F9300-6 board is required or a serial to parallel converter.

If a serial to parallel converter is used, in the printer setup menu select device type Epson, and remote control from RS-232.

RS-232 Remote control port settings:

Baud rate	: 9600 or 19200
Characters length (bits)	: 8
Parity	: none
Number of stop bits	: 1

The following printers and printer switch positions have been tested via serial to parallel adapter.

	Switch 1	Switch 2
1. Epson LQ-1000	1, 2, 3, 4 : ON	2, 6, 7 : ON
2. Diconix 150P	1: ON	2, 6, 7 : ON
3. HP-ThinkJet 2225C	2, 4, 5 : ON	
4. HP-DeskJet 550 C	all down	6 up for 19200 bauds

Note: all Epson and Epson Compatible printers are likely to work if the switches are set properly, (Some experimentation may be required).

Some available serial to parallel converters need power through the RS-232 lines. Do not use them, as we do not guarantee that the serial port is able to furnish enough power.

10.3.2 RS-232 Printers

10.3.2.1 Epson FX80

It is possible to use the standard RS-232 cable. Such a printer has the optional RS-232 interface " #8143 " installed. The configuration that follows is valid for the default scope setting. The standard cable is usable.

In the particular case of an FX850:

- the main switches SW1 SW2 remain at the factory configuration

SW1	:	1	2	3	4	5	6	7	8
		OFF	OFF	ON	OFF	OFF	ON	ON	ON

SW2	:	1	2	3	4
		ON	OFF	OFF	OFF

- the 8143 switches are set to:

1	2	3	4	5	6	7	8
ON	OFF	OFF	OFF	n/a	OFF	OFF	ON

- the 8143 jumpers remain at the factory settings:

J1	J2	J3	J4	J5	JC	JNOR	JRVE	JF	JX
OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	OFF

Note: Epson printers only support XON/XOFF support handshake if they have a print buffer. Such printer are : FX, FX+, JX-80, LQ-800/1000, EX-800 and LQ-25000. Otherwise, use DTR/RTS handshake.

10.3.2.2 Citizen 120D

To use this printer with the default RS-232 setting and default printer setting of the 9354A/T, select the following switch configuration:
DIP switch bank 1 : all OFF except 3 and 8, DIP switch bank 2 : all OFF.

10.3.2.3 HP LaserJet

Make sure that page feed is ON in the plotter menu to use the LaserJet. It is advisable to start out in single density with a size of A5. Then, depending upon the internal buffer size on the LaserJet, the image size and/or density can be increased. At one point, the internal buffer size of the DSO is also reached. The image is simply truncated, indicating that either density or size have to be reduced.

10.3.2.4 HP QuietJet

10.3.2.5 HP ThinkJet

To use printer with the default RS-232 setting and with the default cable select the following switch configuration:

- mode switch:

1 2 3 4		5 6 7 8
0 0 0 0	: 11" page length	0 0 0 0
1	: 12" page length	

- RS-232 switch:

1	2 3	4 5
1	0 0	0 0
(use DTR handshake)	(8bits, parity none)	(9600 bauds)

Note : it may be possible that old ThinkJet recognize only the Epson protocol. If it is the case use the Epson.

10.3.2.6 HP DeskJet 550C

The standard cable is usable. The printer has been tested at 19200 bauds with the following configuration :

Switch 1 or Bank A : all down

Switch 2 or Bank B : 6 up for 19200 bauds, all the other down

10.3.2.7 Brother Printers

The Brother M-1509 and M-1709 have been tested with a serial connection. On the oscilloscope select "Epson FX-80 or compatible printer".

The switch settings are identical for both the printers:

- SW1 :	1	2	3	4	5	6	7	8
	ON	ON	ON	OFF	ON	n/a	n/a	ON

- SW1 :	1	2	3	4	5	6	7	8
	←		ALL OFF			→		

- SW1 :	1	2	3	4	5	6	7	8
	OFF	OFF	OFF	OFF	11" : OFF 12" : ON	OFF	ON	OFF

10.3.3 GPIB Printers

10.3.3.1 HP QuietJet

Make sure the dip switches on the backplane of the printer are set to

- SRQ enable:	0
- GPIB listen only:	
Listen always:	1
A5 to A1:	0 0 1 1 1
- GPIB Addressed:	
Listen always:	0
A5 to A1:	0 0 1 1 1

10.3.3.2 HP ThinkJet (HP 2225A)

Make sure the dip switches on the backplane of the printer are set to

- SRQ Enable:	0
- GPIB listen only:	
Listen always	1
A5 to A1:	0 0 1 1 1
- GPIB Addressed:	
Listen always:	0
A5 to A1:	0 0 1 1 1

10.3.3.3 HP PaintJet (black/white only)

Make sure the dip switches near the GPIB connector are set to:

- GPIB Listen only:	
NORM/SCS:	NORM
A3 to A1:	1 1 1
PC8/ROM8:	N/A
ENG/MET:	has to match paper size ENG = 11" MET = 12"
- GPIB addressed:	
NORM/SCS:	NORM
A3 to A1:	any combination except 1 1 1 (correspond to add. 0-6)
PC8/ROM8:	N/A
ENG/MET:	has to match paper size ENG = 11" MET = 12"

10.4 Information on GPIB

10.4.1 Introduction

This section is a simple description of the GPIB interface as an aid to understanding the interface in the 9354A/T DSO: it is not intended as a complete specification of the system.

The GPIB system is designed for the interaction of a number of devices, which may transmit or receive information as required. The system includes data lines over which the actual data are sent, bus management lines for control, and handshake lines to ensure correct acceptance of data at the right destination. The main features of the bus are summarized below:

Maximum number of devices	15
Maximum bus length	20 meters or 2 meters per device, whichever is less.
Connection	star or chain

Note that more than half of any connected devices must be powered up, even if they will not be used.

Data lines	8 DIO	1 to 8
Handshake lines	DAV	Data available
	NRFD	Not ready for data
	NDAC	not data accepted
Bus management lines	EOI	End or identity
	IFC	Interface clear
	SRQ	Service request
	ATN	Attention
	REN	Remote enable

Active level	+0.4 V
Inactive level	+3,3 V

Note that all signal lines are active low, and that they are wire 0Red to allow participation by all devices.
In addition, there are 8 ground lines, making a total of 24 lines.

10.4.2 Functions in the GPIB

In order to allow satisfactory interconnection of several devices the following functions must be provided

- Enabling any device to transmit data
- Preventing any device from transmitting data
- Enabling any device to receive data

- Preventing any device to receive data
- Transmitting data to a specific device
- Ensuring that only one device is transmitting
- Ensuring that transmitting takes place only when reception is possible
- Enabling any device to request servicing
- Identify type of data to be sent

Any device can be activated into the "talk" or "listen" state, and can be deactivated by the commands "untalk" and "unlisten". Also a device can be a "controller".

Maximum number of current talkers	1
Maximum number of current listeners	14
Maximum number of current controllers	1

Function of bus lines:

- DAV — Data available; talker says the data on the line are valid.

- NRFD — Not ready for data; listener says it is not ready for more data.
All listeners must release the NRFD line, i.e., let it go high, before talker can send.

- NDAC — Not data accepted; listener says it has not yet accepted the data. Talker must hold all data lines steady until all listeners have released this line, i.e., it goes high.

Clearly, the NRFD and NDAC are easy to implement by a wired OR system, so that any one device asserting the signal prevents progress to the next step. Progress is made at the speed of the slowest listener. A simple timing diagram is given in figure 10.1, and another way of presenting the system is given in figure 10.2.

The bus management lines functions as follows:

- EOI — End Or Identify; talker sends this with last byte of a block transfer to indicate last byte. Also used with ATN to parallel poll devices for their status bit.

- IFC — InterFace Clear; places the GPIB system into a quiescent state.

- SRQ — Service ReQuest; any device can send it to the controller to indicate need for attention, and tc request interruption of current operations.

- ATN — ATeNtion; controller sends this to specify whether DIO lines are to be used for interface messages, e.g., addressing, or for data.

- REN — Remote ENable; selects a device as being under local or remote control.

Addressing of the devices on the GPIB bus consult a specialized GPIB-IEEE488 document.

The principles of GPIB are quite simple - the system must wait for all users, and lines are wire ORed so that all can pull the lines down. The handshake sequence is illustrated in two ways. In figure 10.1 the signal waveforms are sketched.

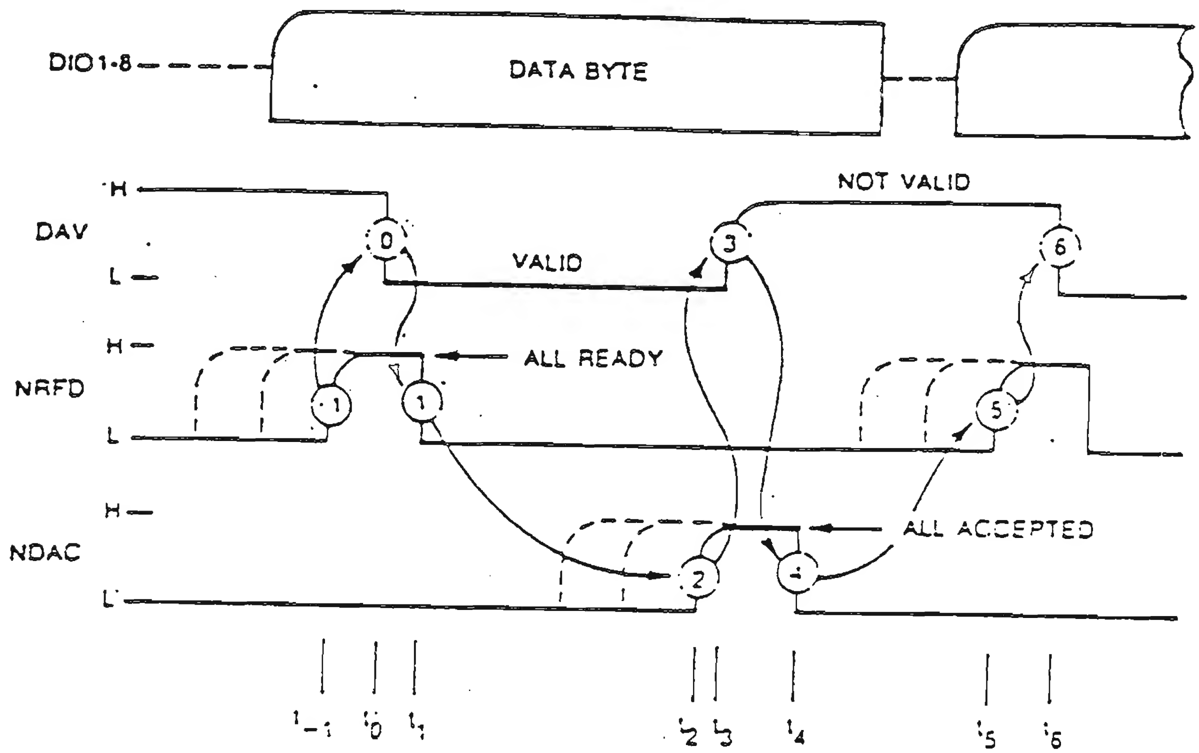


Figure 10.1 : DATA BYTE TRANSFER IN GPIB IEEE-488

The handshake timing sequence proceeds as follows:

Preliminary	The source checks for presence of listeners and places the next data byte on the data lines DI01-8.
t-1	Acceptors one by one become ready for byte. Last one allows NRFD to go high.
t0	Sources pulls down DAV to validate data.
t1	The first litener to accept the data pulls down NRFD to show it is no longer ready for a new byte.
t2	The listeners one by one accept the data, and the last one lets NDAC go high.
t3	The source sets DAV high to show this byte is no longer valid.
t4	The listeners one by one accept this, the first one pulling NDAC low for the next cycle.
t5	As for t-1.

LeCroy